Complete

BROOKLYN BOTANIC GARDEN
RECORD

VOL. III JANUARY, 1914 No. 1

EDITED BY
C. STUART GAGER

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BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Instructor*

MISS BERTHA M. EVES, *Secretary*

MISS HELEN VIRGINIA STELLE, *Librarian*

MR. GUY BISBY, *Assistant in the Laboratory*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. JOHN V. BORIN, *Head Gardener*

MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

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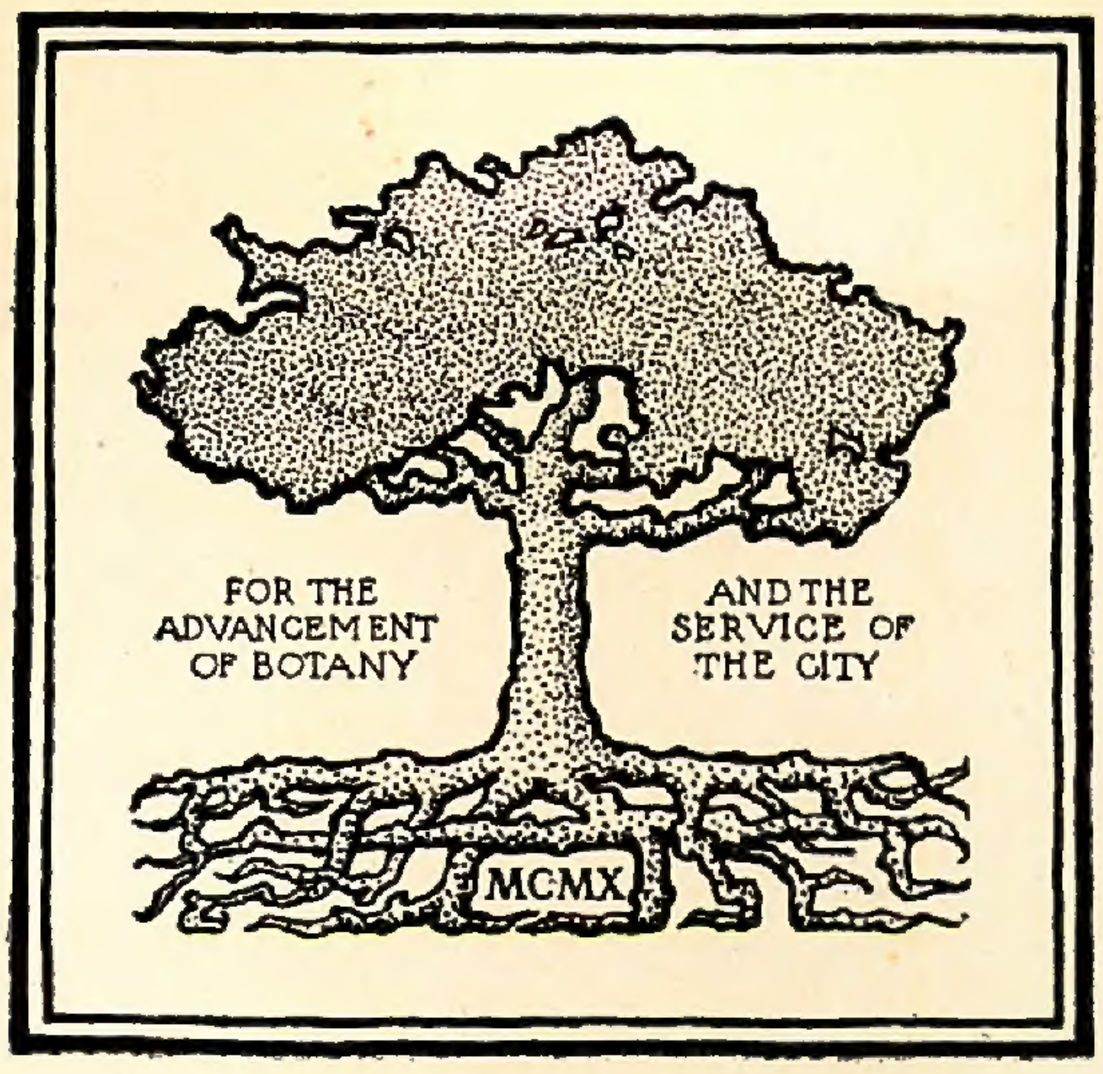

VOLUME III

1914

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ERRATA

Page 27, line 5, for "second" read "third."

Page 74, line 25, for "August" read "July;" for "September" read "August."

R. M. Harper G. Bisby E. W. Olive Miss Shaw J. Doll W. H. Fox
O. E. White N. Taylor Miss Eves Miss Stelle Miss Sabens C. Schaeffer
F. A. Lucas C. S. Gager Prof. Engler

FIG. 1. TREE PLANTING GROUP, OCTOBER 16, 1913.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. III. Brooklyn, N. Y, January, 1914 No. 1

PROSPECTUS OF COURSES

OFFERED BY THE

BROOKLYN BOTANIC GARDEN, 1914

Children's Gardens and Nature Study

1. GARDEN PRACTICE: A course in outdoor work, open only to those pupils who are recommended by their teachers for excellence in nature study in their schools. The work includes the raising of common vegetables, flowers, and fiber plants. 12 lessons on every Saturday morning, 10:30–11:30, from April 11–June 27. Miss Shaw.

2. NATURE STUDY: *Spring Course.* The structure and germination of seeds; the parts of a plant and their uses; relation of the plant to soil, air, water, and light. The course consists of actual study of the plants themselves, with experiments and greenhouse work done by the children; no book work, no home work, no examinations. Open to children from 8–12 years of age. A certificate will be given those who satisfactorily complete the course. 10 lessons on successive Saturday mornings, Jan. 10–March 14, from 9–10.

Fall Course. A similar course will be given in the fall from Sept. 19–Nov. 21. Miss Shaw.

3. BACK YARD GARDENS: Assistance in planning and planting home gardens. Open to children whose names are sent in by their principals, teachers, or parents. Appointments may be made for such help for Wednesday afternoons beginning Feb. 18, and Saturday afternoons during the late spring and summer. Address Miss Ellen Eddy Shaw.

Household Botany and Horticulture

4. KITCHEN GARDENING: A short course designed for those women who desire to work in their own small gardens, and for those interested in domestic science. Garden plans, preparation of seed beds, tools, varieties of seed, seed sowing, and cultivation. 10 lectures and outdoor demonstrations. Every Tuesday from 3–4 p.m., March 17–May 19. Miss Shaw.

5. THE SMALL FLOWER GARDEN: Plans, color schemes, preparation of garden beds, planting, transplanting, cultivation, the wild flower garden. 6 lectures and outdoor demonstrations. Open to adults interested in flower gardens. Friday afternoons from 3–4 p.m., April 10–May 15. Miss Shaw.

6. INDOOR PLANT CULTURE: A course for those who enjoy raising plants in their homes. Bulbs, house plants, window gardening, methods of propagating plants in the house. 5 lectures and demonstrations, every Wednesday from 4–5 p.m., Sept. 23–Oct. 21. Miss Shaw.

7. LANDSCAPE DESIGN: Three illustrated lectures on the principles of landscape design for small areas; supplemented by three field excursions. Wednesday afternoons from 4–5 p.m., March 4, 11, and 18. Mr. Caparn; Mr. Taylor.

8. BACTERIA AND OTHER MICRO-ORGANISMS IN THE HOME: Eight periods devoted to lectures, laboratory work, and conferences on the occurrence of bacteria, yeasts, molds and other micro-organisms in the home, in water, sewage, etc. Wednesdays at 4 p.m., March 4–Apr. 22. Dr. Olive.

Note: Courses 4 to 8, inclusive, are open free to members of The Brooklyn Institute of Arts and Sciences on presentation of membership certificate; to all others there is a nominal charge of fifty cents for each course to cover incidental expenses.

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9. THE GARDEN WEEK BY WEEK: *A. Fall Course.* Lessons on the preparation for winter, outdoor planting of bulbs, winter cover crops, taking up and storing of plants. On six consecutive Thursday afternoons from 3:30–5 p.m., Sept. 24–Oct. 29. A fee of $1.00 will be charged to cover material used.

B. Spring Course. Practical work, taking up garden operations, and those things which should be done each week in preparation for the outdoor season. Greenhouse and outdoor practice, with a few explanatory lectures. On 15 consecutive Thursday afternoons from 3:30–5 p.m., Feb. 5–May 14. A fee of $2.50 will be charged to cover laboratory and outdoor expenses.

Miss Shaw, Mr. Caparn, Mr. Taylor, Mr. Borin.

Short Course in Popular Botany

10. Local Flora: The elements of systematic botany, primarily for the purpose of getting acquainted with the native wild flowers. Field collecting, the making of a herbarium (for those who wish), lectures, and conferences. Specially valuable for teachers of nature study. Eight Saturday mornings, at 9 o'clock, beginning April 4. Free.

Course for Teachers of School Gardening

There is an increasing demand for persons adequately prepared to become teachers or supervisors of children's gardens, but opportunities to secure the necessary preparation are not numerous. As in other cases where special problems are to be met and solved, an interest in children, a mere liking for the work, or even native teaching ability, while highly essential, are not, of themselves, sufficient to insure success.

The following nine courses (11–19) are planned to acquaint the prospective teacher with some of the main problems to be met with in this work, and such effective solutions of them as have been worked out in practice. *The nine courses are considered as a unit, and are not offered separately.* Wherever possible it is urged that the entire course be completed within two school years. Special importance is attached to number 19.

The fee for the entire course is Fifteen Dollars, which must be paid at the time of registration.

A certificate will be granted to those who satisfactorily complete the work.

11. Elementary Botany: A survey of general physiological and morphological principles, illustrated by a few of the more im-

portant types of plants. 8 lectures and demonstrations in laboratory and greenhouse. A high school course in botany, extending over at least one-half year, will be accepted in place of this course. Wednesdays, at 4 p.m., Jan. 7–Feb. 25. Dr. Olive.

12. Nature Study: Nature in relation to gardens and plant life. Topics: plant structure; fruit and fruit formation; weeds; weed dispersal; insect pests; birds in their relation to agriculture; garden friends; shrubs; shade and lawn trees. Credit will be given for this course in Nature Study on presentation of a satisfactory certificate of similar work done at any other accredited institution. 12 lectures, Tuesdays, 4–5 p.m., March 17–June 2. Miss Shaw.

13. Soils and Agricultural Principles: A study of soils; fertilizers, natural and chemical; relation of water and air to soil; liming soils; mixing of soils and tillage. 4 lectures and laboratory work. Mondays in January from 4–5 p.m. Miss Shaw.

14. Plant Propagation and Greenhouse Work: Methods of plant propagation, care of plants, cuttings, raising of seedlings for the outdoor garden. Work related to children's gardens. Laboratory work. 9 lessons. Fridays, Feb. 6–April 3, from 3:30–5 p.m. Miss Shaw.

15. Fungous and Insect Pests: 3 lectures and demonstrations on the occurrence of, and methods of combating the commoner fungous and insect pests of garden and greenhouse plants. Wednesdays at 5 p.m., March 4–March 18. Dr. Olive.

16. Children's Garden Practice: Practice work with a class of children; including such topics as planning and making the garden, laying out of grounds, preparation of soil, seed sowing, transplanting, cropping, cultivation, school garden management, improvement of school grounds, preparation of exhibits. 20 lectures and outdoor practice work. Saturday mornings, 10–11:30 from Jan. 24–June 6. Miss Shaw.

17. Fall Garden Work: Practical work with the outdoor bulb bed, harvesting of garden crops, indoor planting of bulbs, raising of plants indoors, the window box. 6 lessons on Friday afternoons from 4–5, Sept. 25–Oct. 30. Miss Shaw.

18. Pedagogy of Botany: A brief discussion of the mental processes involved in learning and teaching science, and the fun-

damental principles which underlie and point the way to laboratory and field work. 5 successive Saturday mornings at 9 o'clock, beginning Oct. 24. Dr. Gager.

19. Practical Garden Work: A summer's work with children in a garden under supervision. This work may be done at the Brooklyn Botanic Garden, or its equivalent in some children's garden, the work of which is acceptable to the Botanic Garden.

Advanced Courses and Investigation

For the following advanced and research courses there is a charge covering all expenses, including laboratory fee, of $30 for a full course of 100 credit hours, and $20 for a half course of 50 credit hours.

Advanced Courses

20. Mycology and Plant Pathology: Morphology and pathology of the fungi and bacteria. Life histories of fungi; methods of control of plant diseases, etc. Prerequisite, a satisfactory college course in general botany. 100 credit hours of work. This course alternates with course 22. Offered in the spring of 1914. Hours to be arranged. Dr. Olive and Mr. Bisby.

21. Fresh-Water Microbiology: A course of lectures, recitations, and laboratory work on the various organisms found in drinking water. Odors, colors, etc., of drinking water; methods of microscopical and bacteriological examination. 50 credit hours of work offered in the fall of 1914, beginning in September. Hours to be arranged. Dr. Olive and Mr. Bisby.

22. Cytology: A course of lectures and laboratory work on cell physiology and cell morphology. Methods of cytological technique, and practice in accurate interpretation of cell phenomena. Prerequisite, satisfactory college courses in general botany and plant physiology. 100 credit hours of work. This course alternates with course 20. Offered in the fall of 1914, beginning in September. Hours to be arranged. Dr. Olive and Mr. Bisby.

23. Experimental Evolution: Detailed studies of the nature and causes of variation and heredity. Some of the subjects considered are: Historical Resumé of the Evolution Theory, Physical Basis of Inheritance, Inheritance of Acquired Characters, Kinds

and Causes of Variation, Mendelism, Biometry, Principles and Technique of Plant Breeding. This course is open to college students with a knowledge of the elements of physics, chemistry, geology, botany, and zoology. The work is primarily intended for students in pure science, and for agricultural or horticultural students fitting themselves for various professional activities in these particular fields. Three lectures and two laboratory periods a week. 100 credit hours of work. Hours to be arranged.

Dr. White.

24. PHYTOGEOGRAPHY. A course dealing with plant distribution over the earth. Prerequisites are courses in plant ecology, geology, and a good general knowledge of climatology and systematic botany. 50 credit hours of work. Hours to be arranged.

Mr. Taylor.

Department of Graduate Study and Research

25. SEMINAR: A biweekly meeting of the Garden Staff and advanced students for the discussion of fundamental problems of botany, or of general biology. Open to others on invitation. Topic for 1913–1914, Heredity and Plant Breeding. Alternate Mondays at four o'clock.

26. JOURNAL CLUB: A biweekly meeting of the Garden Staff and advanced students for the review and discussion of current botanical literature. Open to others on invitation. Alternate Mondays, on weeks alternating with the seminar, at four o'clock.

The following research courses are open only to properly accredited college graduates.

27. RESEARCH IN PLANT PHYSIOLOGY: Independent investigation of problems of plant metabolism and irritability. Thesis.

Dr. Gager.

28. RESEARCH IN MYCOLOGY AND PLANT PATHOLOGY: Independent investigation of problems in fungi and fungous diseases of plants.

Dr. Olive.

29. RESEARCH IN PLANT GENETICS: Independent investigation of problems of variation and heredity, including that phase of cytology having a direct bearing on the subject matter of genetics.

Dr. White.

Cooperation with Local Schools

A. Talks at Schools: The principals of any schools, public or private, may arrange with the Director to have lantern talks given at the schools on various topics related to nature study, such as garden work with children, tree planting, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Principals may address the Director for appointments.

B. School Classes at the Garden: Schools not provided with lanterns may arrange for their classes, accompanied by their teachers, to come to the Botanic Garden for such talks as are mentioned above. At present, not more than 70 children can be accommodated at any one time.

The Garden equipment, including greenhouse, plant material, lecture room, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. This must be arranged by appointment with the Director, so that such work will not conflict with regular classes and lectures.

The principal of any secondary school in Brooklyn may arrange also for a series of ten lessons on plant culture to be given during the fall to a class. These lessons will be worked out for the most part in the greenhouse. Such a course must be arranged for in advance, and the class must be accompanied by its teacher.

C. Consultations: Conferences may be arranged by teachers and principals for discussion of problems in connection with gardening and nature study. Monday and Saturday afternoons are usually available for this purpose. Appointments must be made in advance. Address Miss Shaw.

D. Study and Loan Material: On request, the Garden will endeavor to provide living seedlings or plant parts for study, to the extent of our present limited facilities. Teachers may arrange to have various physiological experiments or demonstrations conducted at the garden. Petri dishes, ready for exposure, will also be loaned on request of teachers. Schools must arrange to call for study or loan material, and must return the loan material promptly in good condition.

Docentry

Classes, and other parties of several persons, wishing to view the plantations under guidance, may arrange with the Curator of Public Instruction for appointments with a docent to conduct them through the Garden.

The Herbarium

The Garden herbarium consists at present of about 40,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algae, and myxomycetes. This collection may be consulted by those interested, and specimens submitted will be gladly identified. Address the Curator of Plants.

The Library

The rapidly growing library of the Garden occupies temporary quarters on the main floor of the laboratory building. This is not a circulating library, but is open for consultation without charge, to all persons, from 9 a.m. until 5 p.m. Over 60 current periodicals devoted to botany and related subjects are regularly received.

Lectures

For Children

Stories About Useful Plants. (Illustrated.) For children of members of The Brooklyn Institute of Arts and Sciences. Admission only by ticket, which may be had on application to Miss Shaw. Saturdays at 2 p.m.

April 18. *Rope and how it is made.* (*Manila and sisal fibers.*)
April 25. *The story of bread.* (*Wheat.*)
May 2. *Beverage plants.* (*Cocoa and chocolate.*)
May 9. *A plant serving a useful purpose.* (*Rubber.*)
May 16. *The food of half a billion people.* (*Rice.*)

Talks on Gardens. (Illustrated.) Open to all children without charge. Tickets may be had on application to Miss Shaw. Mondays at 4 p.m.

April 20. *How to make a garden.*
April 27. *The seed—How plants start.* (*Illustrated by experiments and pictures.*)
May 4. *Birds and their relation to gardens.*

May 11. *The garden's friends and foes.*
May 18. *The wild flowers now in bloom.*

It is necessary to limit the number of tickets for these talks to children. This is due to the small size of the present lecture room. Not more than 70 children can be accommodated at any one talk. Tickets will be issued in the order of application until the number of tickets is exhausted.

These talks will be repeated for school classes, if so desired, either at the Garden or at the school. Another series of talks will be given during the fall and early winter. Further particulars will be announced later.

FOR ADULTS

SPRING COURSE: LECTURES ON CIVIC BOTANY. Saturdays at 4 p.m.

May 2. *Dangers to plants from the city's smoke and gas.* DR. C. STUART GAGER.
May 9. *Conservation of forests.* DR. E. W. OLIVE.
May 16. *Foreign fruits of our city markets.* MR. NORMAN TAYLOR.
May 23. *Economic importance of plant breeding.* Dr. O. E. WHITE.

FALL COURSE: A full announcement will be issued in the fall.

THE NEED FOR ADDITIONAL ENDOWMENT

In his "The rise and early constitution of Universities," Laurie has well said that, "The enthusiasm of a few may initiate an institution; but law, privilege, organization, and endowment can alone make it endure." The Brooklyn Botanic Garden was initiated by the enthusiasm of a few, and it has had the advantage of favorable law, privilege, and organization. The few who initiated it have continued their enthusiasm, and have given their constant and substantial support, but the rapid development of the Garden, and the broad lines along which this development is projected, and is being carried out, have increased our needs for private funds greatly beyond our present income from endowment and special contributions.

The present income from endowment amounts to about $2,650. By the terms of our agreement with the City of New York, all plants must be purchased from private funds. It is also the adopted policy of the Garden that all books for the library, and their binding, and all lantern slides for lectures shall be purchased with private funds. These two demands, together with miscellaneous drafts on the fund, have, since the Garden was started, consumed practically the entire amount, and generous special contributions in addition.

Other purposes for which the Garden urgently needs additional annual income include the following:

1. Leaflets (printing and mailing)	$1,000.00
2. Motion pictures (equipment for taking and projecting)	500.00
3. Study collections to loan to schools	200.00
4. Botanical illustrating (including lantern slides, photography, and pen artist)	1,100.00
5. Prizes for botanical work of merit by school pupils	50.00
6. Public scientific lectures	200.00
	$3,050.00

This sum ($3,050) represents the income on an endowment of something over $60,000 at 5 per cent. The immediate need of funds for the first four purposes named above is pressing, in order to insure the largest returns from what has already been invested in buildings, grounds, library, herbarium, and scientific staff.

1. *Leaflets.*—Nothing, to date, undertaken by the Garden has proved to be so popular, nor apparently so much wanted, as the *Leaflets,* the publication of which was begun on April 10, 1913. Our mailing list has nearly doubled since the first number was issued, and requests for quantities of from 50 to 200 have been received from teachers of all grades, from the grammar schools, through high school and normal school to university classes. These *Leaflets* are distributed free of charge, and since they appear almost weekly during the period of publication, the annual expense for printing and mailing is considerable. A generous gift of Mr. Alfred T. White, acknowledged in the preceding RECORD, has enabled us to complete the first series, to issue several double numbers (of 8 pages), and to include illustrations. But

the publication has demonstrated its usefulness and its success sufficiently to justify an appeal for a permanent fund, producing an annual income of from $800 to $1,000.

2. *Motion Pictures.*—Little has yet been done in the application of motion pictures to plant life. To be sure we have seen a few flower buds open, and one or two seeds germinate, but the possibilities have hardly yet been realized, not only of popularizing a phase of plant life almost unknown outside of advanced laboratories, but of making advanced teaching more effective, and even of adding to the possibilities of research. Funds should be available at once sufficient to enable the Garden to conduct experiments involving the taking of negatives, and to enrich its public lectures with motion films.

3. *Study Collections.*—The Board of Education of New York City has been more generous than the boards of many other cities in providing living plant-material for the high school courses in botany, but, as noted in the July, 1913, number of the RECORD, there is no provision whatever made by the Board of Education to enable the teachers of nature study in the elementary schools to carry out the requirements of the nature study syllabus. It would be unwise for the Garden to attempt to supply any, or even a large share of this material; the enormous quantities of it which are demanded make this impracticable; but there are certain things, the preparation of which requires a knowledge of botany and of class-room needs, and which, therefore, cannot, to good advantage, be secured from a commercial florist. This material, together with lantern slides for school lectures, the Garden could supply in the form of loan collections. Their preparation, annual maintenance, and distribution would need a sum of about $200 a year.

4. *Botanical Illustrating.*—The giving of popular and technical lectures, and the issuing of popular and scientific publications, together with the making of lantern slides to loan to schools, demands the preparation of botanical illustrations in large quantities. This requires the purchase of considerable material and equipment, and the services, on part time, of a photographer and a pen artist. Eleven hundred dollars is a conservative estimate of the amount that could be used to advantage for this purpose each year.

5. *Prizes for Botanical Work of Merit.*—The Garden believes that a healthy stimulus to the study of plant life would be afforded by offering a number of prizes for botanical accomplishment of a high order of merit both in local high schools and at the Garden by school pupils. The prizes should not be of such a nature or value as to be sought after from mercenary motives, and might take the form of valuable books on botany or closely related subjects. An annual sum of $50 would be sufficient for this purpose.

6. *Public Scientific Lectures.*—Regular courses of free, popular, and more or less elementary lectures will be given at the Garden, by members of its staff, to young people and adults. In addition to these, and as a real intellectual stimulus, a series of more advanced, semi-popular lectures by botanists of recognized ability, ought to be given at the Garden each year, free of charge. With a modest honorarium, two hundred dollars would enable the Garden to offer an annual course of from four to five such lectures. To establish a foundation for this purpose would be a service very much worth rendering the community, and one that would at once enhance the prestige of the Garden and the value of its public service.

Besides the above items, there ought ultimately to be established at the Garden two or three research curatorships, each with an income of at least $3,000, and several fellowships, with an income of $500. The unsolved problems, the investigation of which would be made possible and encouraged by such foundations, are important, not alone because their solution would help to advance natural knowledge, and enlarge our understanding of life in general and of plant life in particular, all of which is very much worth while, but because many of these problems, in their bearing upon right living, or their relation to large economic questions and commercial enterprises, intimately touch our daily lives. Agriculture is sorely in need of a better understanding of facts and principles to be derived by a study of plant breeding and genetics; the ground has hardly been scratched in the matter of improving medicinal plants and growing them as a commercial crop; by a better understanding of the causes of plant diseases and their treatment, thousands of dollars might be saved every year on each of several agricultural crops.

It is most appropriate that our equipment should be utilized and increased for the purpose of carrying on investigations along some of the lines above indicated, and it is equally fitting, even if it were not (as it is) necessary, that the additional funds essential for this work should be derived from private income. There are many large industries and commercial enterprises, concerned wholly or in large part with plants or plant products, and which ought to be interested to encourage the investigations above noted. More detailed information will be gladly supplied by the director of the Garden to anyone who may be interested, or who might be willing to become interested in any of these questions and their solution at the Brooklyn Botanic Garden.

C. S. G.

TREE PLANTING BY PROFESSOR ENGLER

The second formal tree planting in the Brooklyn Botanic Garden occurred on October 16, 1913, when the Garden was honored by a visit from Geheimrat Prof. Dr. Adolph Engler, Director of the Royal Botanic Garden at Dahlem-Steglitz, near Berlin, and Professor of Botany in the University of Berlin. Professor Engler was passing through New York on his way home, after a trip around the world, beginning in Africa, and concluding in the United States with the International Phytogeographical Excursion, last summer and fall.

At a dinner given to Professor Engler at the New York Botanical Garden on Friday, October 17, he was introduced as "the man who has done more to advance systematic botany than any other person now living." By his "*Das Pflanzenreich,*" and "*Die Vegetation der Erde,*" not to mention numerous other scholarly publications, he has become known to botanists throughout the world.

In keeping with a plan of the Garden, inaugurated on September 12, 1913, with the tree planting by Professor de Vries,* Professor Engler was invited to plant a tree in commemoration of his visit.

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* Brooklyn Bot. Gard. Record 2: 1–7. 1913.

After an inspection of the first section of the new laboratory building and conservatories, the members of the Garden staff and other officials of The Brooklyn Institute of Arts and Sciences, accompanied Professor Engler to the local flora section, where everything was in readiness for the planting. The tulip tree chosen was presented by the curator of plants to the director of the Garden, who introduced the guest of honor. After the planting appropriate remarks were made by Professor Engler. The addresses follow:

By the Curator of Plants

Mr. Director:

As Curator of Plants, I take pleasure in announcing that the tree chosen to be planted by Professor Engler is a specimen of the tulip tree, *Liriodendron tulipifera.*

When it was announced that Professor Engler was to plant a tree for the Garden, we were at some pains to find a tree named for Professor Engler. Among the score or more of plants that have been named for him, there seemed to be only one tree. *Fagus Engleri,* from China, that is hardy in this region. We were unable to get a specimen of this tree. The tulip tree is represented in this country by only a single species, native in the eastern United States, and by one species, a native of China.

The tree makes a magnificent growth in the region just to the south of us, attaining a height of 180 feet and a diameter of about eight feet. During May or June, the tree produces a profusion of large tulip-like flowers, of a greenish-yellow color, followed subsequently by a cone-like fruit, parts of which remain on the tree during the following winter. The tree is interesting not only for its great beauty and size, but also on account of its commercial importance, it being the chief source of the common "white wood" of the lumbermen.

The geological history of the tree is extensive, as ancestors of this *Liriodendron* have been found in the rocks of the Lower Cretaceous, but there is some doubt as to whether this tulip tree of the Cretaceous period is the same as ours; the leaves have the same characteristic notched appearance that our modern tree displays.

BY THE DIRECTOR OF THE GARDEN

Friends of the Garden:

One of the pleasant features of scholarship is that it knows no international boundaries, but stands for a democracy that is world wide. In this respect it differs from both politics and commerce, having neither foreign courts nor custom house duties.

One of the latest expressions of this happy situation was the organization of the International Phytogeographical Excursion. This association of plant geographers met for the first time about two years ago in Great Britain. The second meeting was held this summer in the United States, the first excursion being on July 27, at the Brooklyn Botanic Garden in the morning, and at the unique Hempstead Plains region in the afternoon. This Excursion has spent the entire summer visiting places of botanic interest from New York to California, and now, on the eve of his departure for the *Vaterland,* we enjoy the pleasure and honor of having one of the most distinguished members of this party as our guest. I need not speak his name, for every botanist, amateur as well as professional, knows of the Engler and Prantl system of classification—the system now in general use in Germany and America, and in other countries.

It is common for American scientific men, who are called to administrative positions, to complain that excessive executive duties leave neither time nor strength for a continuation of their scientific investigations. Of Professor Engler, it may be said that, in addition to a prodigious amount of scientific work, he finds both time and strength to administer with marked ability one of the largest and most important botanic gardens in the world, the Royal Botanic Garden at Berlin. We have most of us met Professor Engler this afternoon, and he therefore needs no introduction.

BY PROFESSOR DR. ENGLER*

Mr. Director, Ladies and Gentlemen:

It has given me very great pleasure to plant this North American tree here in this new Garden.

I am a systematic botanist, but I have always enjoyed, not only working in the herbarium, but also studying nature out of doors,

* Edited from stenographic notes.

and walking in the botanic garden. My interest has not been confined to European plants alone, but to their relatives as well, in Asia, Africa, and America; and of the plants which I have come to know, I have always been greatly interested in *Liriodendron tulipifera.*

In the old botanic garden in Breslau there was a very fine specimen of this tree which aroused my interest while I was still a student in that university; for one rarely finds in Europe a tree as interesting as *Liriodendron* in form of foliage and in flower. There was also in the old botanic garden at Berlin a wonderful specimen of this tree which blossomed profusely each year. I regret that this specimen will no doubt be destroyed, now that the old garden has been abandoned.† Possibly it is gone now; I have not visited the locality in some years, but you see I have always had considerable interest in *Liriodendron.*

Doubtless some of you may know that in the new Berlin garden, I have arranged phytogeographical sections, and have devoted considerable space to the flora of North America, represented in characteristic formations; and here, among other species, we have included the *Liriodendron.*

It had never occurred to me that I might some day be invited to plant a specimen of this tree in North America, and to do this has been a source of very great pleasure. It is my wish that this *Liriodendron* may grow well; and not the tree only, for I wish for a vigorous growth and evolution for the Garden as a whole.

The fact that botanic gardens are becoming more numerous than formerly is a good sign of increasing interest in botany. In Europe, and especially in Germany, we have botanic gardens in university towns, and more recently they have begun to be developed in other cities also. It is well for every large town to have parks for the refreshment of the public, and such parks can often be given a botanical character. It is not always necessary to have greenhouses, which are expensive, for one can do much in the way of a natural arrangement with good scenic effects out of doors. In many of the large cities, and also in the smaller towns of

†It will be recalled that the site of the Berlin garden was transferred about three years ago to a new and more favorable location at Dahlem, a suburb of Berlin.

Europe, we have botanic gardens of various extensions, and I am very glad to see that you are beginning to develop more botanic gardens here in America.

You already have one large botanical garden in New York, and possibly some persons may think that on this account it is not necessary to develop another garden here in Brooklyn. But New York City is a complex of ten or more towns, and the trip from Brooklyn to the Bronx is not easily made. It seems to me very fitting that you should have another garden here in Brooklyn, and I hope that its director will have great success with his planting, and that the Botanic Garden of the Brooklyn Institute, like the tree we have planted, may have a good vigorous growth.

A NEW BOTANICAL JOURNAL

With the authority of the Committee on Botanic Garden of the Board of Trustees, the Garden has entered into an agreement with the Botanical Society of America, whereby the two organizations will cooperate in the issuing of a botanical magazine, called the American Journal of Botany. The new publication, edited by a committee appointed by the Botanical Society, and published by the Garden, will be the official organ of the Society. For the present, each volume will comprise ten numbers of approximately forty-eight pages each, issued monthly except during July and August.

By this cooperation there will be accomplished what could not well be done successfully by either party, acting alone. From the Society will come an efficient board of editors, representing a wide geographical range, and a wide range of botanical interests, an assured list of subscribers at the outset, a certain amount of financial backing in addition to subscriptions, and all the very necessary advantages of a friendly, enthusiastic constituency.

The Garden, for its part, affords the advantages of a fixed office of publication widely known to the botanical world, and equipped to care for the business end of the magazine with a minimum of expense; a place for the receipt and proper library care of all ex-

changes, where they will be placed at the disposal of the botanical public in a large center of population; a permanent place to store and properly care for back numbers; and the cooperation and support of a scientific staff. Most essential of all, the Garden has assumed sufficient financial responsibility, in addition to the support of the Society, to assure the monetary success of the venture, and the agreement, entered into for a period of three years, will, it is believed, prove to be of mutual advantage.

The need of additional facilities for publishing the results of botanical research has been felt in the United States for some time. During the past few years the amount of research has increased much faster than the facilities for publication, so that papers have frequently to lie in the editorial office from twelve to eighteen months before publication. On this account many papers lose their timeliness or importance before they can be issued.

The Garden bespeaks the support of all its friends in the form of papers for publication, and of advertisements and subscriptions. The subscription price to all persons not members of the Botanical Society of America is four dollars a year; to members of the Botanical Society, three dollars.

A sample copy of the first number may be had on application. Communications concerning editorial matters should be addressed to Prof. F. C. Newcombe, 9 Geddes Heights, Ann Arbor, Mich.; business communications to American Journal of Botany, Brooklyn Botanic Garden, Brooklyn, N. Y.

C. S. G.

NOTES

On September 17–20, 1913, the Botanic Garden staff moved from the temporary quarters occupied since the fall of 1910, in the Central Museum, to the first section of the new laboratory building in the Garden. During the past three years, the work of developing the Garden has assumed such proportions that this first section was entirely outgrown before it was occupied, and the need for the second section is urgent. Application has been made for an appropriation for the construction of the next section.

In accordance with action taken by the Executive Committee of the Board of Trustees on October 14, 1913, the herbarium of the Brooklyn Institute, comprising approximately 30,000 specimens, formerly housed in the Museum building, has been transferred to the Botanic Garden building, and forms the nucleus of the Garden herbarium. In addition to this, between 45,000 and 50,000 specimens have been added to the herbarium by the Garden during the past year.

The Garden is indebted to Mr. Dick S. Ramsay for the gift of four large century plants (*Agave Americana*), which were received from Easton, Pa., on November 19.

Recent additions to the herbarium include 2,200 specimens of the *Fungi Columbiani,* and 800 North American Uredinales, of E. Bartholomew, making a total of 3,000 specimens.

Mr. Alfred T. White, chairman of the committee on botanic garden of the board of trustees, has presented the Garden library with two rare and interesting volumes. The first is a copy of "The American Physitian; or, a Treatise of the Roots, Plants, Trees, Shrubs, Fruits, Herbs, etc., Growing in the English Plantations in America. Describing the Place, Time, Names, Kindes, Temperature, Vertues and uses of them, either for Diet, Physick, etc., Whereunto is added a Discourse of the Cacao-Nut-Tree, and the Use of its Fruit; with all the ways of making Chocolate. The like never extant before. By *W. Hughes.* London, Printed by *J. C.* for *William Crook,* at the Green Dragon without Temple-Bar, 1672." The volume is a perfect copy of the very rare first edition, bound in Russia extra, gilt edge, by C. Lewis. The second volume is a copy of the "Musaeum Tradescantianum: or, A Collection of Rarities. Preserved at South Lambeth neer London. By John Tradescant, London, 1656."

On Saturday, October 18th, the senior class of the Yale School of Forestry, accompanied by their instructor, Mr. J. J. Levison, made their second annual visit to the Garden. The class this year numbers sixteen.

During the past semester an arrangement was entered into between the trustees of The Brooklyn Institute of Arts and Sciences and the trustees of the Brooklyn Public Library, through the

librarian, Mr. Frank P. Hill, whereby the Brooklyn Public Library has completed its set of Curtis's Botanical Magazine, comprising 138 volumes, from volume 1 (1793) to volume 138 (1912), and two volumes of index, and has placed the entire set on deposit in the library of the Brooklyn Botanic Garden. The Brooklyn Public Library will also continue its subscription to this valuable work. The books were received on October 25.

A beautifully mounted collection of slime molds (Myxomycetes) has been presented to the Garden by Mr. Harold Wingate, of Brooklyn. The collection consists of 155 specimens, distributed among about 130 different species. They were gathered for the most part in the vicinity of Philadelphia, in the region where Dr. Rex, the famous collector of Myxomycetes, gathered most of his material.

The Science Room Conference on November 15th, under the auspices of the Department of Botany of the Brooklyn Institute, was conducted by Dr. Olive, the subject being "A Comparison of the Physiological Processes of Plants and Animals." The conference was well attended and the discussion was interesting and lively.

Meetings of the Seminar of the Botanic Garden staff and invited members were resumed on Thursday, November 6, at 4 p.m. As heretofore, the meetings will be held fortnightly throughout the academic year. During the present year, the subject of heredity will continue to form the basis of discussion.

A Journal Club has been organized by the Garden staff to meet bi-weekly, alternating with the Seminar, for the purpose of reviewing current botanical literature. The first meeting was held on December 1, at 4 p.m. Teachers of botany in local schools have been invited to join the club.

The Garden is pleased to acknowledge the receipt, from James McCutcheon and Company, of New York City, of an attractive case containing an exhibit of the economic uses of flax, including dried specimens of the plant which supplies the raw fiber out of which linen is made, flax seed, and samples of different kinds of linen goods manufactured from this fiber. An endeavor is being made by the Garden to secure numerous exhibits of this sort, to be

used in illustrating lectures on the economic uses of plants and plant products.

At the meeting of the New York Chapter of the National Nature Study Association, held at Teachers College, Columbia University, on Saturday, November 15, 1913, Miss Ellen Eddy Shaw, of the Garden staff, was elected President for the ensuing year. Other officers elected were Vice President, Miss Grace G. Lyman; Secretary and Treasurer, Miss Charlotte Lee.

The popularity of the Garden *Leaflets*, to which we have already called attention in a previous number of the RECORD, has greatly increased since we have been enabled to illustrate them and enlarge them by the generous gift of Mr. Alfred T. White. Fifty copies of numbers 12 and 13 were sent by request for use of the pupils at the City Training School, Jamaica, L. I., and fifty copies of number 12 were requested for use with a local company of Boy Scouts. Almost daily requests continue to be received by the Garden for the regular receipt of the *Leaflets* as issued.

On August 23, 1913, Miss Helen J. Aitken, assistant curator, department of mollusks, at the Central Museum, placed in the Garden brook several snails of the species *Goniobasis virginicum* Gmelin and *Campeloma decisum* Say. These specimens were collected in the Morris Canal at Great Notch, New Jersey, on August 21, 1913. It is a wish of the Garden to make the brook as interesting for its fauna as for its flora, and we will be glad to have it stocked with specimens of small aquatic animals, which might be of zoological interest.

The first course of instruction offered to the public in the new building was for adults, on Indoor Plant Culture, with five sessions, conducted by Miss Shaw on successive Wednesday afternoons, beginning October 22. The topics covered were bulbs, house plants, window boxes, methods of propagation, and greenhouse work. A syllabus of the topic to be discussed was distributed at each session. Forty-six persons registered for the course.

Cooperation with local high schools began last October, when four lessons on the planting of bulbs were given by Miss Shaw to two different classes from the Girls' High School. One class was composed of fourteen pupils in the botany course for commercial

students, and the other of seventeen pupils in the regular botany course. On November 11 a third class of thirteen from the same school made use of the greenhouse to study methods of plant propagation. The pupils worked in groups, each group taking up some one means of propagation, such as seeds, bulbs, stems, or leaves. Each group later explained its own work to the class as a whole.

Prof. William Bray, of Syracuse University, accompanied by Mrs. Bray, visited the Garden on November 15.

On November 5, 1913, Dr. R. M. Harper, of College Point, L. I., presented to the Garden his mounted collection of Georgia plants, made during the years 1895–1897, comprising 653 sheets, and representing about 650 species. Among them is the type specimen of *Scirpus Georgianus* Harper, a species stated by Robinson and Fernald to range from Quebec to Michigan, Georgia, and Arkansas.

Mr. Charles M. Dow, of Jamestown, N. Y., chairman of the Letchworth Park Committee of the American Scenic and Historic Preservation Society, and director of the State Reservation at Niagara Falls, N. Y., visited the Garden on November 23, accompanied by Mr. James O. Howard, superintendent of Letchworth Park, and Mr. Henry K. Elruh, superintendent of the Reservation.

On account of the remarkably late continuation of mild weather during the past fall, it was possible to do outside work in the Garden to advantage up to November 22, on which date the day laborers were dismissed. The laying of sod was continued up to November 20, and this was a great advantage, as the new grading along the upper part of the brook made it very desirable to sod the steep banks before winter set in, so as to protect them from serious erosion.

Work on the second (central) section of the conservatories was completed on December 10, 1913, but it will not be feasible to install the plants in this house until next spring. The grading contractor, Mr. John Connor, completed the grading on December 1. This work includes the esplanade approach to the Museum building and the removal of a portion of the embankment adjacent

to Mt. Prospect reservoir on the east, giving a means of approach to the Garden from Eastern Parkway.

On the basis of "information recently received at the United States Bureau of Education," *School Science and Mathematics* states that a well-known philanthropist has recently donated two fully equipped moving picture machines to the schools of Berlin. One is to be used in the Continuation Institute for Higher Teachers, and the other in the high schools of greater Berlin. Moving-picture films are now available in Germany for anatomical, biological, and bacteriological courses.

The meeting of the International Phytogeographical Excursion, for 1913, was held in the United States, under the leadership of Prof. Henry C. Cowles, of the University of Chicago, and Prof. F. E. Clements, of the University of Minnesota. The first excursion was on July 27, including the Brooklyn Botanic Garden in the morning and the Hempstead Plains of Long Island in the afternoon. Following the visit to the Garden, the members of the party were the guests of the Garden at an informal luncheon. For the afternoon trip the party was met at the Westbury station of the Long Island R. R., by Mr. Henry Hicks, of Isaac Hicks & Son, who generously provided autos and acted as guide over the plains. The three following days were spent in the pine barrens of New Jersey, and on July 30, the party visited the New York Botanical Garden, being entertained at luncheon at the home of the director, and at dinner in the evening at the Hermitage Hotel, near the garden. The entire summer was spent visiting places of botanical and scenic interest throughout the United States, including the Yellowstone National Park, the big-tree groves of California, and the Desert Laboratory of the Carnegie Institution, at Tucson, Arizona. Foreign members of the excursion who visited the Garden included Prof. Dr. A. Engler, of Berlin, Dr. Ove Paulsen, of Copenhagen, Dr. T. J. Stomps, of Amsterdam, and Prof. Carl Schröter, of Zürich. On the afternoon of October 8, Professor Schröter delivered an illustrated lecture, under the joint auspices of the Garden and the Department of Botany of the Institute, on Alpine Flora. (By a printer's error this paragraph was omitted from the October number of the RECORD.)

On Saturday afternoon, December 13, 1913, the President and Trustees of the Brooklyn Institute of Arts and Sciences, the Committee on Botanic Garden, and the Director and Staff of the Garden received the members of the Department of Botany of the Institute and their friends, at the opening of the first section of the new laboratory building, and conservatories. The interior was decorated with palms and a color scheme of red and green in anticipation of the Christmas season. In the lecture room light refreshments were served, Mrs. L. H. Pounds, wife of the Borough President of Brooklyn, presiding at the coffee urn and Mrs. F. A. Lucas, wife of the Director of the American Museum of Natural History, at the tea urn. About two hundred guests were present, including President A. Augustus Healy, Vice-President Col. Robert T. Woodward, Mr. Alfred T. White, Chairman of the Committee on Botanic Garden, Mrs. White, Mr. Gates D. Fahnestock, Mr. W. H. Fox, Director of the Central Museum, Mrs. Fox, Dr. F. A. Lucas, director of the American Museum of Natural History, Mrs. Lucas, Dr. W. A. Murrill, assistant director of the New York Botanical Garden, Mrs. Murrill, Dr. Arthur Hollick, director elect of the Museum of the Staten Island Association of Arts and Sciences, Mrs. Hollick, Borough President Lewis H. Pounds, Mrs. Pounds, the Misses White, Mrs. C. Stuart Gager, Mr. J. Adolph Mullenhauer, Mr. Thos. H. Coates, Mr. John Mickleborough, Mrs. Mary Van Norden, Mrs. Clayton A. Peters, Miss Peters, Dr. and Mrs. Fred. J. Seaver, Mr. and Mrs. Percy Wilson, Mr. John McCallum, Miss Jean Broadhurst, Miss E. M. Kittredge, Mrs. Helen B. Schoonhoven, Mrs. Annie Morrill Smith, Mrs. Norman Taylor, Mrs. E. W. Olive, Mrs. O. E. White, Miss Agnes Eaton Bowen, Dr. and Mrs. C. G. Purdy, Miss Purdy, Mr. and Mrs. Edward F. Stevens, Miss Susan A. Hutchinson, Mr. J. M. Johnson, Mr. and Mrs. Thomas F. Casey, Dr. and Mrs. C. A. King, Miss Anna B. Gallup, Miss Miriam S. Draper, Miss Margaret W. Carmichael, Mr. and Mrs. Geo. P. Engelhardt, Miss Mary D. Lee, Mr. and Mrs. Herbert Judy, Miss Ridenour, Mr. Seamens, Mr. and Mrs. Robert Cushman Murphy, Prof. D. S. Martin, Miss Helen J. Aitken, Miss Lena M. Telfer, Miss Grace Parsons Hart, Miss Hart.

The unusually mild autumn has prolonged the flowering season of a number of species of herbaceous plants in the garden. During the last week in November and the first week in December, the common tansy and *Rosa rugosa* were both in flower, also some shrubs of *Forsythia.* The first killing frost was on the night of December 7 and 8.

During November the Garden received from the New York Botanical Garden a gift of about 123 potted plants. These represent a large number of families and genera, and make a very desirable nucleus for the conservatory collections. Among the more rare and interesting plants are *Schizocarpa* and *Tacca,* of the Taccaceae. There is also a general collection illustrating the palms, some relatives of the arrow-root, the pineapple family, and some of the epiphytic cacti.

The *Museum Bulletin* of the Staten Island Association of Arts and Sciences, for December, 1913, records the resignation of Mr. Charles Louis Pollard as curator-in-chief of the Museum, and the election of Dr. Arthur Hollick, now curator of fossil plants at the New York Botanical Garden, to succeed him. Mr. Pollard will devote himself to work with the Boy Scouts of America, as Deputy Scout Commissioner for Staten Island.

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PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the Director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.
2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.
3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.
4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.
5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.
6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia Podophylli, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to all who wish them.

BROOKLYN BOTANIC GARDEN
RECORD

VOL. III APRIL, 1914 No. 2

EDITED BY
C. STUART GAGER

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BOTANIC GARDEN STAFF

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MR. NORMAN TAYLOR, *Curator of Plants*

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OLMSTED BROS., *Landscape Architects*

FIG. 2. First sections of laboratory building and conservatories, looking west from Washington Avenue. July 27, 1913.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. III April, 1914 No. 2

THIRD ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN, 1913

REPORT OF THE DIRECTOR

TO THE COMMITTEE ON BOTANIC GARDEN.

Gentlemen: I have the honor to submit herewith the second annual report of the Brooklyn Botanic Garden of The Brooklyn Institute of Arts and Sciences for the year ending December 31, 1913.

Building Operations

Work on the first section of the laboratory buildings and conservatories was in progress from January 1 to February 17, when a delay began on account of the non-delivery of Spanish tile for the roof. On April 1, the weather having become favorable, the contractors began to lay the stucco on the exterior of the laboratory building, and this work, including the placing of the name tablets on the frieze and under the windows, was completed during April.

On May 1 all work was again suspended, but was resumed on June 15, after a temporary covering of tar paper was laid on the roof. The tile were delivered during the last week in August, but the laying of them did not begin until the second week in September.

New Building Occupied

On Wednesday, September 24, we began to move into the first section of the new building, from the temporary quarters which were occupied for three years in the Central Museum building.

The new building became the center of all Garden business on Friday, September 26, one year after the date on which the building ought, by terms of the contract, to have been completed.

The progress of the Garden was materially retarded by this long and enforced sojourn in cramped temporary quarters, but nevertheless much was accomplished in the way of preliminary organization, in the acquisition of books, herbarium specimens, lantern slides and negatives, in the starting of four Garden publications, viz., the RECORD, *Contributions, Leaflets,* and *Guides,* in planning and planting the grounds, in organizing the scientific staff, and the gardening and laboring forces, and in giving lectures and addresses before schools, and other organizations, and at the Museum building.

Second Section of the Conservatories

The plans, contract form, and specifications for the second (central) part of the conservatories were transmitted by the Park Commissioner to the Board of Estimate and Apportionment for approval on March 11, 1913, and on June 19, contracts were awarded to the lowest bidders as follows: the general contract (covering foundations and superstructure) to John R. Sheehan & Co., Inc., for $25,380; the contract for heating, to Blake & Williams, for $2,847; the contract for plumbing to the Altman Plumbing Co., for $585. A statement of the bids received was published on page 107 of the Garden RECORD for July, 1913.

On July 8 the Commissioner of Parks directed John R. Sheehan & Co., Inc., to begin work on their contract, covering the foundation and superstructure of the second (central) section of the conservatories, on or before July 14, 1913. The work had actually begun on June 30, and the foundation was completed on August 9. Work on the superstructure began on September 2, and the entire work was completed early in December.

Final Inspection and Payments

On December 26, 1913, was held the final inspection of the first sections of the laboratory building and conservatories, and the second section of the conservatories. At this inspection, there was present Mr. H. W. Martin and Mr. Walter, representing the

architects (McKim, Mead & White); Mr. Lincoln Pierson and Mr. Sefton, of the Pierson U-Bar Co.; Mr. Ohmes, of Nygren, Tenny & Ohmes (consulting engineers for the heating plant); Mr. Cockerill, of the contractors for the first section (Cockerill & Little Co.); Mr. J. F. Johnston, of the Johnston Heating Co. (subcontractors for the heating plant of the first sections); and the director of the Botanic Garden. The director of the Garden called attention to several features not yet satisfactory to the Garden, and was assured that these would receive prompt attention and be adjusted to the entire satisfaction of the Garden.

On December 27, 1913, the architects issued to the Commissioner of Parks, Borough of Brooklyn, a certificate for final payment on the contract for the first part. The amount of this payment was $6,806.30.

The certificate for final payment ($5,252.40) on the contract for the second section of the conservatories was issued on December 15, 1913.

The following are the items charged against the original authorization of $100,000 for the construction of the first and second sections of the buildings:

Cockerill & Little Co. (first section)	$58,132.99
John R. Sheehan & Co. (palm house)	25,486.00
Blake & Williams (heating plant, palm house)	2,847.00
Altman Plumbing Co. (plumbing, palm house)	614.00
Wahle Phillips (lighting fixtures, laboratory building)	284.90
Flatbush Gas Co. (lamps)	23.80
Lord Electric Co. (first section)	197.00
Lieberman & Sandford Co. (screens for heating coils, palm house entrance)	125.00
	$87,710.69
Architects' fees, based upon cost of the entire building.	6,500.00
	$94,210.69

This leaves an unexpended balance of ($100,000–94,210.69) $5,789.31.

Conservatories Installed and Opened

During November, 1913, the Garden received from the New York Botanical Garden a gift of 198 potted plants, representing about 123 species.

This gift forms the nucleus of our conservatory collection, which now numbers about 250 specimens, representing 140 species. It was not our original intention to open the conservatories to the public until these plants could be properly labeled, but the demand became too large and too insistent to be disregarded, and it was therefore decided to admit the public without further delay. Nearly two hundred persons visited the collection on the first day, although no attempt had been made to advertise the fact that it was open.

Opening Reception.—The members of the Board of Trustees and of the Council of the Institute, and the members of the Department of Botany and their friends, were invited to inspect the first sections of the building and conservatories, on Saturday afternoon, December 13, 1913. Full accounts of this function have appeared in the city papers, and will also appear in the Garden RECORD for January, 1914.

The Grounds

Resetting of Reservoir Fence Completed.—On March 24 the Mott Iron Works men resumed work on the resetting of the iron fence which was moved the preceding fall to the new boundary between the Mt. Prospect reservoir property and that of the Garden. The work was accepted by the Garden about May 15, and the invoice of $957, the contract price for the work, was approved and forwarded to the treasurer for payment on June 24, 1913.

Painting the Street Fence.—Attention may be called to the fact that the repainting of 3,600 linear feet of iron fence, along Flatbush and Washington Aves., was accomplished during the winter months of 1912–13, by four of our own men, without any extra appropriation for labor or materials.

Out of Doors Work Resumed.—Spring work out of doors was resumed on March 17, most of the employees of last year having applied for reappointment. The season was unusually forward (about four weeks in advance of 1912), and good weather continued until unusually late in the fall, so that out of doors operations were not brought to a close until November 21, one week later than in 1912.

Grading Operations.—The first contract for grading was let on June 12, to John Connor, the lowest bidder.* On July 8 the Commissioner of Parks directed the contractor to begin work on his contract on or before July 14, 1913. Operations were actually begun on June 30. The work was specified to be completed within 75 working days, and by these terms it should have been completed on October 16. It was not, however, completed until December 3, 1913, 143 days from the time of beginning. After allowing 25 days for extension of time granted, and after deducting 36 days for bad weather, Sundays, and holidays, there remained (143–136) seven days over time.

This work has made about two-thirds of the Garden unfit for pedestrians, and has made it impossible to walk with comfort from the Local Flora section, in the northwest corner of the Garden, to the plantations at the southern end. On this account the number of classes and other organizations visiting the Garden has been noticeably reduced.

Boulder Wall.—In order to save a valuable tree (*Pseudolarix Kaempferi*) which was in danger of being smothered by the fill along the top of the embankment northwest of the lake, our own laborers constructed a retaining wall of boulders for a distance of about 60 feet, and with a maximum height near the center of about 7 feet.

Work in Prospect Park.—It was agreed between the Institute and the Park authorities that the Garden laboring force would attend to all stripping of top-soil, and all tree cutting necessary on the embankment at the site of the fill in the park. This work has been cared for, and in addition some 18–20 trees have been protected by the building of boulder walls around the bases of the trunks.

All of this work, not of course anticipated when the appropriation for maintenance for 1913 was asked for, has been a serious drain on our laboring force, as it has kept an average of 3–4 men, out of a total of only 8–10 laborers (besides a large part of the time of the foreman), busy nearly every day during August and September. As a result, much of the Garden work proper has suffered.

* A detailed statement of the bids and payments for this work is given on page 73 *infra*.

The Brook.—The report of the curator of plants calls attention to the reconstruction of the upper portion of the brook, near the lake, necessitated by the grading operations. In addition to this work, the swamp and most of the pools were enlarged during the spring and summer.

Plans for New Grading.—During the fall and winter of 1913 the preparation of plans was under way for completing the grading of the area between Mt. Prospect reservoir and the Museum building. To complete this work, and to secure a good lawn on the portion graded during 1913, will require an additional appropriation by the City from corporate stock.

Walks.—During December the preparation of Olmsted Bros. of plans and specifications for new walks throughout the Garden was well under way.

Value of the Land Comprising the Garden

The cost value of the land comprising the Garden, as recorded on page 98 of the Garden RECORD for July, 1913, on the authority of the Comptroller's report, as published on page 4159 of the *City Record* for May 6, 1913, was subsequently found to be erroneous, since the figures there given refer to only a portion of the Garden property. Since part of the land included in the Garden was acquired with the original Prospect Park lands, and part with the site of Mt. Prospect reservoir, it is not possible now to determine the cost of the particular portions of these acquisitions now devoted to the use of the Garden.

However, by correspondence with the office of the Comptroller, it has been ascertained that the present value of the Garden land is placed at $2,400,000, of which $2,200,000 refers to the original area assigned by the Department of Parks for Garden purposes on December 28, 1909; and $200,000 to the addition between Mt. Prospect reservoir and the Museum building, assigned to the Institute for the use of the Garden on September 9, 1912. These figures do not include the site of the Central Museum, nor the improvements to our property since it was acquired. These figures, and those for property adjacent to the Garden, are shown on the map, figure 5.

Plantations

Classification Revised.—The classification of the plantations, as given in the First Annual Report,* has been slightly revised by including the arboretum and fruticetum as subdivisions under the systematic section, and thus reducing the number of sections from ten to eight.

Work Done.—The work done on sections I–IV and VI is noted in the appended report of the curator of plants. The installation of Sections V, VII, and VIII has not yet been begun.

Method of Accessioning.—When a plant of a given species (or several specimens of the same species from the same locality) is added to the systematic collection of living plants it is assigned an accession number, which serves to designate this plant (or plants) as long as it remains a part of the systematic collection. If, subsequently, another specimen (or several specimens) of the same species is received, from the same or another locality, it is accessioned and designated by another accession number, the next unassigned in the series. Thus the number of accession numbers assigned may exceed the number of species represented, while the number of individual plants is always much larger than the number of species.

Number of Plants under Cultivation.—Attention is here called to the statement of the curator of plants (p. 55), showing that 1347 accession numbers were assigned to living plants during the year, giving a total of 3,859 accessions to date. The living plants now under cultivation represent 804 genera and 3,105 species. This includes only the plants in the Local Flora, and the general systematic section, and in the conservatories.

Library

Permanent Quarters.—The permanent quarters planned for the Garden library are in portions of the building not yet constructed. For the present the steel stacks and other library equipment have been installed in the elementary laboratory (west room) on the main floor.

Growth.—The appended report of the librarian shows a total of 1,630 bound volumes and approximately 1,100 bound pamphlets, while the number of periodicals being received, having to do with botany or closely related subjects, is sixty-three.

* Brooklyn Bot. Gard. Record 1: 31–32. Ap 1912.

Cooperation with Brooklyn Public Library.—During the past year negotiations were carried on with Mr. Frank P. Hill, librarian of the Brooklyn Public Library, resulting in an arrangement being effected whereby that library was to complete its set of Curtis's Botanical Magazine, renew its subscription, and deposit with the Garden library the complete set, and the subsequent volumes as completed. The set complete, from volume 1 (1793) to volume 138 (1912), and two volumes of index, was received at the Garden on October 25. This is a very valuable set of books, and is a very substantial addition to our library.

Transfer from the Museum Library.—At the meeting of the Committee on Botanic Garden, on November 11, 1913, I reported the transfer from the library of the Ceneral Museum to the Garden library, of the botanical books and pamphlets, together with catalog cards and the Torrey Botanical Club card index of American botanical literature. This transfer was made in accordance with a motion of the Executive Committee of the Board of Trustees on October 14, 1913, adopting a recommendation by Mr. Alfred T. White, as follows:

"Mr. White recommends that the herbarium and botanical library now in the museum be removed to the Botanic Garden building, except where this would involve taking parts of sets of books; these to be left in the museum; it being understood that any part of the herbarium or library removed may be recalled at any time if needed."

A tabular statement of the library items transferred is given in the report of the librarian, page 66.

The librarian of the Museum has filed with the Garden the following:

MEMORANDUM OF VALUATION OF MUSEUM LIBRARY PROPERTY TRANSFERRED TO THE BROOKLYN BOTANIC GARDEN*

Actually spent by Museum Library for books, binding, etc.	$1,215.75
Pamphlets	1.65
Torrey Botanical Club cards	132.64
Estimated cost of books, etc., received previous to reorganization, by gift, exchange, etc.	289.50
Total	$1,639.54

* Exclusive of work on catalog cards, expense of filing Torrey cards, etc.

Use of the Library.—As stated in the report of the librarian, the library is not, and cannot very well be, a circulating library. Its greatest usefulness, all things considered, depends upon its being administered as a reference library. It is a pleasure to note that it is being consulted in increasing numbers by others than members of the Garden staff.

Herbarium

Administration.—As is frequently done in herbarium administration, curatorial duties have been divided, and the spermatophytes (seed-bearing plants) and pteridophytes (ferns and fern-allies) have been assigned to the curator of plants, with whose other duties and interests this part of the herbarium is most closely related; and, for a like reason, the lower cryptogams (mosses, liverworts, lichens, fungi, algae, and slime-moulds) have been assigned to the curator of public instruction. For convenience, these two sections will hereafter be referred to as the phanerogamic and the cryptogamic herbaria respectively.

Growth.—During the past year the phanerogamic herbarium has been increased by over 47,000 specimens, in addition to the herbarium of the Department of Botany, comprising about 30,000 specimens, which was transferred to the Garden, in accordance with the resolution of the Executive Committee of the Trustees, as recorded above on page 34. The total number of specimens in this section of the herbarium is now nearly 80,000, which represents a growth of nearly 50,000 during the three years since the Garden was established.

The cryptogamic division of the herbarium of the Department of Botany, when transferred to the Garden, contained a total of 8,750 specimens, as itemized in the appended report of the curator of public instruction, page 61. Previous to this transfer we had acquired about 2,200 specimens, chiefly of parasitic fungi, but during the past year this collection has been increased, largely by generous gifts, to 24,492 specimens, or nearly three times the total acquisitions previous to the establishment of the Garden.

The total number of specimens in both herbaria on December 31 was over 104,000.

New Cases.—The cumbersome wooden cases which held the

herbarium specimens in the Museum were transferred to the Garden for temporary use, but they had long since ceased to be suitable, either in size or type, and the phanerogamic collections are now being transferred as rapidly as possible to new steel cases, made according to our own specifications. The maximum capacity of the new cases is about 21,000 sheets, or only one fifth of the number now on hand. The cryptogamic collections have also reached the full capacity of the cases available.

Investigations

Local Flora.—At the time of the appointment of Mr. Taylor as curator of plants, in the spring of 1911, he was at work on a phytogeographical study of the local flora. The limits of the area included in the term local flora are roughly delimited by a circle having a radius of one hundred miles from New York City as a center. The area was defined several years ago by a committee of the Torrey Botanical Club, and comprises certain arbitrary inclusions, including the entire states of New Jersey and Connecticut. In harmony with the terms of an agreement between our Garden and the New York Botanical Garden, at the time of Mr. Taylor's appointment, the results of this study, covering five consecutive years, will be published as a Memoir of the New York Garden, and is expected to appear during 1914.

Plant Diseases.—During the year Dr. Olive has continued his studies on two diseases of the potato caused by a parasitic fungus (*Fusarium*), and popularly known respectively as the "potato wilt" and "dry rot." He is also making a study of a disease of the sugar beet, of unknown origin, and causing great damage in some of the Western States, amounting in some cases to a loss of nine-tenths of the entire crop. The discovery of the nature and cause of this disease would point the way to treatment and prophylaxis, and would obviously be of great economic as well as scientific importance. Dr. Olive's studies of the wheat rust, and of other plant rusts, have also been continued, and partial results of these studies were embodied in his paper on "Intermingling of perennial sporophytic and gametophytic generations in *Puccinia Podophylli, P. obtegens* and *Uromyces Glycyrrhizae,*" which appeared in August as No. 6 of the Garden Contributions.

Mycology.—Under Dr. Olive's direction Mr. Bisby has made a study of certain problems in connection with plant rusts, has collected and carried along numerous cultures of the Myxomycetes (slime-moulds), for the purpose of securing material for study of the life history of these lowly organisms, and has made progress in a study of certain phases in the life history of *Cyathus,* one of the bird's-nest fungi. A preliminary report on this latter work was presented for Mr. Bisby by Dr. Olive, at the 1913–1914 Atlanta meeting of the Botanical Society of America.

Plant Breeding.—Dr. White has carried through pedigreed cultures of a number of different plants as material for his studies in experimental evolution and plant breeding, and of fundamental principles which underlie heredity. Studies which he began in the Bussey Institution, before his appointment to the Garden staff, have been partly prepared for publication. This work will appear under the general title, "Studies of teratological phenomena in their relation to evolution and the problems of heredity," and the first paper, with the sub-title, "A study of certain floral abnormalities in *Nicotiana,* and their bearing on theories of dominance," will appear in the first (January, 1914) number of the new *American Journal of Botany.*

Plant Physiology.—In connection with his graduate work at Columbia University, Mr. Adlerblum has begun, under the supervision of the director of the Garden, a study of certain problems of digestion in the potato tuber.

A brief investigation has been made by the director of the Garden, of the value of a certain commercial compound purported to be radioactive, as a stimulus to the growth of crops. If the addition of a radioactive substance to the soil would substantially increase the yield of crops, and could be accomplished at a cost that was not prohibitive, the discovery of this fact and of such a compound would be of very great economic importance. The brief experiments here alluded to have, so far, yielded only negative results.

Publications of Members of Staff during 1913

Gager, C. Stuart. School gardens in Ceylon. Brooklyn Bot. Gard. Record **2**: 18–20. Ja 1913.

—— Second annual report of the Brooklyn Botanic Garden, 1912. *Ibid.* **2**: 25–45. Ap 1913.

—— Nature study in the public schools of Greater New York. *Ibid.* **2**: 85–90. Jl 1913.

—— Foundation and organization of the Brooklyn Botanic Garden. *Ibid.* **2**: 109–114. O 1913.

—— Botany. Univ. of Missouri Bull. Sci. Ser. Ser. 1. Mathematical and Physical Sciences. **1**: 149–173. Jl 1913.

—— Ganong's The Living Plant. (Review.) Torreya **13**: 259–263. N 1913.

—— The opening of buds. Brooklyn Bot. Gard. Leaflets **1**[2] 16 Ap 1913.

—— The pollination of pines. *Ibid.* **1**[5]. 7 My 1913.

—— Leaf-fall. *Ibid.* **1**[14]. 29 O 1913.

Olive, Edgar W. Conference with high school teachers. Brooklyn Bot. Gard. Record **2**: 11–12. Ja 1913.

—— Report of a trip to botanical institutions. *Ibid.* **2**: 12 Ja 1913.

—— Kinds and positions of buds. Brooklyn Bot. Gard. Leaflets **1**[3]. 22 Ap 1913.

—— The leaves of pines and other conifers. *Ibid.* **1**[7]. 21 My 1913.

—— The work of green leaves. *Ibid.* **1**[8]. 4 Je 1913.

—— Respiration in plants. *Ibid.* **1**[9]. 18 Je 1913.

—— Intermingling of perennial sporophytic and gametophytic generations in *Puccinia Podophylli, P. obtegens* and *Uromyces Glycyrrhizae.* Annales Mycologici **11**: 297–311. Plates XV. Au 1913. Reissued as Brooklyn Bot. Gard. Contrib. No. 6.

—— Botany in relation to agriculture and other applied sciences. Brooklyn Bot. Gard. Record **2**: 115–119. O 1913.

Shaw, Ellen Eddy. Window gardening. Sch. Gard. Assoc. Amer. Second Ann. Rept. p. 42. Ap 1913.

—— Bulb culture. Brooklyn Bot. Gard. Leaflets **1**[12]. 8 O 1913.

—— Kinds and characteristics of bulbs. *Ibid.* **1**[13]. 22 O 1913.

—— Nine short articles in the Young Folks' Department. The Garden Mag. Jan–June, Sept.–Nov. 1913.

—— Four editorials. The Nat. Plant, Flower and Fruit Guild Mag. Nos. 1–4, Jan., Mch., June, Sept., 1913.

—— Twelve reviews of books. Country Life in Amer. Jan.–Dec., 1913.

Taylor, N. Report of a trip to Rochester and the Arnold Arboretum. Brooklyn Bot. Gard. Record **2**: 15–18. Ja 1913.
——Two popular Handbooks. (Review.) Torreya **13**: 17–19. Ja 1913.
—— Some plants flowering early in April. Brooklyn Bot. Gard. Leaflets **1**[1]. 10 Ap 1913.
—— Some native wild flowers now in bloom. *Loc. cit.* **1**[3]. 22 Ap 1913.
—— A plant new to the state of New York and the local flora range. Torreya **13**: 78. Ap 1913.
——Blakeslee and Jarvis. "Trees in Winter." (Review.) The Nation, 24 Ap 1913.
—— Francis, M. E. The Book of Grasses. (Review.) The Nation, 24 Ap 1913.
—— Report of the Curator of Plants (for 1912). Brooklyn Bot. Gard. Record **2**: 46–60. Ap 1913.
—— Some plants flowering early in May. Brooklyn Bot. Gard. Leaflets **1**[4]. 30 Ap 1913.
—— Plants now in bloom. *Ibid.* **1**[5]. 7 My 1913.
—— Plants flowering in the last half of May. *Ibid.* **1**[6]. 14 My 1913.
—— Shrubs now blooming. *Ibid.* **1**[9]. 18 Je 1913.
—— Britton & Brown's Illustrated Flora, second edition. (Review.) Torreya **13**: 186–192. Au 1913.
—— Dykes, G. H. The genus Iris. (Review.) The Nation, 7 Au 1913.
—— Our Native Shrubs and what may be done with them. (Reprinted from *Garden Magazine*. April 1912.) Brooklyn Bot. Gard. Leaflets **1**[11]. 24 S 1913.
—— Sargent, F. L. Plants and their uses. (Review.) The Nation, 30 O 1913.
White, O. E. The bearing of teratological development in *Nicotiana* on theories of heredity. American Naturalist **47**: 206–228. 1913.
—— Some interesting varieties of corn growing in the garden. Brooklyn Bot. Gard. Leaflets **1**[10]: Figs. 1–4. Sept. 1913.

Public Lectures, Addresses, and Papers

Public lectures, addresses, and papers have been delivered by members of staff as follows:

By the director of the Garden:

April 1. The Brooklyn Botanic Garden. Before the Mothers' Club of Public School 47.

April 30. The Botanic Garden and its use to the schools and people of Brooklyn. Before two assemblies at the Boys' High School, Brooklyn.

May 2. Spring flowers and trees of Greater New York. Arbor Day talk before the Training School for Teachers, Jamaica, L. I.

By the curator of public instruction:

Jan. 2. Intermingling of perennial sporophytic and gametophytic mycelium in rusts. Before the Botanical Society of America, at Cleveland, O.

Jan. 24. Forestry. Before classes in biology from the Girls' High School. At the Central Museum, Brooklyn.

Jan. 27. Forestry. Before the Biology Club of Erasmus Hall High School, Brooklyn.

Feb. 24. The life histories of rusts. Before the Torrey Botanical Club, at the New York Botanical Garden.

Apr. 22. The Brooklyn Botanic Garden. Before the Men's Club of the Mt. Olivet Presbyterian Church, Brooklyn.

May 9. The educational work of the Brooklyn Botanic Garden. Before the Commercial High School, Brooklyn.

May 20. Camp hygiene. Before the senior class in engineering, at New York University.

Nov. 15. A comparison of plant and animal physiological processes. Before the Science room conference of the Brooklyn Institute, Academy of Music.

By the curator of plants:

Feb. 6. The Hempstead Plains and the preservation of the local flora. Shedowa Garden Club, Garden City Casino.

July 5. The Hempstead Plains, a natural eastern prairie. N. Y. Botanical Garden.

Sept. 5. Preservation of our native flora and its use for wild-gardening Lake Mahopak Protective Association, Lake Mahopak, N. Y.

By the assistant curator of plant breeding:

Dec. 30. Studies of teratological phenomena in their relation to evolution and the problems of heredity. Before the Botanical Society of America, at Atlanta, Ga.

By the instructor:

Oct. 14. The Brooklyn Botanic Garden—What it means to the people of Brooklyn. At the Bethany Settlement, Brooklyn, N. Y.

Nov. 17. The education of today. Before the Mothers' Club of Woodmere Academy, Woodmere, L. I.

Nov. 18. Botanic Gardens. Woodmere Academy, Woodmere, L. I.

Nov. 20. The Brooklyn Botanic Garden. At the Ethical Culture School.

Nov. 26. Nature's Thanksgiving. At the Ethical Culture School.

Dec. 11. Nature Study in the Elementary Schools. Before the public school teachers of Hackensack, Hackensack, N. J.

By the laboratory assistant:

Dec. 31. A preliminary note on spore-formation in Cyathus. Before the Botanical Society of America, at Atlanta, Ga.

Field Meetings

The following field meetings were conducted during the year:

May 29–June 2. The Department of Botany of the Institute, at Amagansett and Montauk, L. I., *by the curator of plants.*

Aug. 24. The Pharmaceutical Society of New York, at the Garden, *by the curator of public instruction.*

Oct. 29. Botany Class from the Girls' High School (Brooklyn). At the Garden, *by the instructor.*

Nov. 1. The Department of Botany of the Institute, at Queens, L. I., *by the curator of public instruction.*

Publications of the Garden

Record.—The four quarterly issues, comprising volume two, contained 140 pages, or 24 pages more than during 1912. By another year this publication should be issued bi-monthly.

Contributions.—Only one number (No. 7) of the *Contributions* appeared during 1913.

Leaflets.—This publication was inaugurated by the appearance on April 10, of Series 1, No. 1, and the first series terminated with No. 14, on October 29. The period of issue extends, at present, from April to October. The great popularity of this little leaflet, far surpassing all expectation, has been previously noted in the RECORD.

Announcements.—A plan has been adopted of sending out notices of courses of instruction, lectures, and other similar events by means of a series of *Announcements,* numbered consecutively. Two numbers have been issued.

Booklet of Information.—In December was issued a small booklet of "Information concerning the Brooklyn Botanic Garden," comprising eight pages and cover, of convenient size to be carried in the pocket, and containing a diagram showing the location of the Garden with reference to all lines of rapid transit by which it may be reached.

American Journal of Botany.—The RECORD for January, 1914, will contain a full statement of the inauguration of this new botanical journal, to be published by the Garden, in cooperation with the Botanical Society of America, and to be edited by a committee of that society, including two members of the Garden staff. At present it is planned to issue ten numbers a year, omitting the issues of August and September. The full text of the agreement between the Botanical Society of America and the Garden, touching this publication, will be found on pages 74 and 76, *infra.*

Tree Planting by Professor Engler

The planting of a *Liriodendron tulipifera,* on October 16, 1913, by Professor Adolph Engler, Director of the Royal Botanic Garden, at Dahlem-Steglitz, near Berlin, and the exercises connected therewith, will be recorded in full in the Garden RECORD for January, 1914.

Department of Public Instruction

First Course of Instruction.—The first course of instruction to be offered at the Garden by a member of the staff was on Indoor Plant Culture, given on five successive Wednesdays, beginning October 22.

Prospectus for 1914.—A prospectus of courses of instruction and public lectures to be offered during 1914 is in the hands of the printer, and will appear in the Garden RECORD for January, 1914. Twenty-nine different courses are offered, covering work from the most elementary nature study to that of independent research.

Children's Gardens.—Broadly stated, the aim of a botanic garden is the increase and diffusion of a knowledge and love of plants. Every activity, therefore, which will contribute to this end is appropriate and desirable. It is in harmony with this aim that a botanic garden should not only be well equipped for scientific investigations, but should be made as attractive and beautiful as possible. It is in the interests of the same ideal that children's gardens have been planned as a regular part of our work, to begin in the spring of 1914.

No educational development of recent times has done more to enlist the sympathetic interest of children in plant life than this movement, variously designated as school gardens, school farms, farm gardens, and children's gardens. The appeal is made at the most impressionable age, the ground covered embraces the elements of many phases of botanical science, including ecology, physiology, plant structure, and horticulture, the educational results to be secured are not surpassed by those obtainable by any other discipline, and the indirect value of the work, especially for the city boy or girl, who is deprived of most of the peculiar advantages of out-of-door life and intimate contact with nature which the village or country child enjoys, is incalculable. A person who has been brought up from childhood to regard a botanic garden as a place of interest, of pleasure, and of profit, and to regard its activities as having a direct and intimate relation to his own life and to the life of the city as a whole, is not as liable as he otherwise might be, and as many otherwise intelligent and broad-minded persons now are, to question the advantages of such insti-

tutions, and the desirability of their general establishment in American cities, and their maintenance by municipal appropriations.

Course for Teachers.—One of the chief obstacles to the general inauguration of children's gardens is the lack of adequately trained teachers. A beginning has been made in this work in one or two places, but adequate preparation demands a course that will extend over the entire period of garden work, so that all phases of it may be covered and properly illustrated. Moreover, it is desirable to have the course given at a center where there is ample ground to cultivate, a full equipment of gardening appliances and accessories, and where there is a staff of teachers and expert gardeners, competent to give thorough instruction, not only in actual garden operations, but in the fundamental principals of plant life, in nature study, and in such related subjects as the care of house plants, the construction and management of cold frames and hot beds, and in the educational theory underlying the work. It is also essential to have actual classes of children available, one as a practice school, and another as a model school. In other words, the aim should be, not merely the training, but the *education* of teachers, so that their work may be pursued, not as a trade, but as a profession; that they may be able, not merely to carry through, more or less blindly or mechanically, a series of operations and processes according to a program or schedule drawn up for them by someone else, but that they may understand in a broad, scholarly way the educational significance and bearing of their work, that they may have an intelligent grasp of the fundamental problems connected with it, and may be able to make substantial and helpful contributions toward the working out of satisfactory solutions of these problems.

The Garden has, at present, an admirable beginning of equipment for this work. What we need is a larger financial support so that it may be expanded. The children's garden movement is more than a fad; it is a permanent contribution to elementary education, meeting an actual need which cannot well be met in any other way, and the demand for adequately prepared supervisors and teachers is constantly increasing. To endow this work at the Brooklyn Botanic Garden would be to render a lasting and valuable service to elementary education.

Classes from Public Schools.—Under the general supervision of the department of public instruction, arrangements are being made for regular classes of pupils from the public grammar schools and high schools. Classes from the high schools began to hold regular sessions at the Garden during the fall and winter of 1913, and work on a similar basis with grammar school pupils will begin in January, 1914.

Neighborhood Work.—Several classes have been organized with children who live near the Garden, though in several instances the interest in this work has spread to boys and girls living far enough away to necessitate a trolley ride in order to reach the Garden. This work is, of course, in the very early stages of its development, but there is every evidence that it will soon assume as large proportions as we can care for advantageously.

Seminar and Journal Club.—A seminar and a journal club are among the most stimulating of all influences to any body of workers engaged in scientific or other scholarly research. These meetings serve as a clearing house for new ideas, as a medium for the discussion of new problems, and as a means of keeping alive to new work that is being accomplished elsewhere. The value of these meetings does not lie in the number who attend, but in their motive and purpose. Such conferences are essential to the maintenance of a good *tonus,* and of a lively *esprit de corps.* Our seminar and journal club meet on alternate weeks from October to June, and we have been pleased, as also during 1912, to welcome at the meetings a number of biology teachers from various Brooklyn high schools.

Miscellaneous Matters

Meetings at the Garden.—The meeting of the Japan society on May 21, as the guests of the Central Museum and the Garden jointly; the meeting of the Sullivant Moss Society on May 24; the first meeting of the International Phytogeographical Excursion at the Garden and at the Hempstead Plains, under the auspices of the Garden, on July 27; and the opening reception and inspection of the new buildings for the trustees and members of the Council of the Institute, and the members of the Department of Botany, and their friends, on December 13, have all been recorded in various issues of the RECORD.

The Public and the Garden

Attendance.—Under the present simple organization of the Garden there are no guards at the various gates, and we have no means of ascertaining the number of visitors, except by rough estimate. In general it may be said that the attendance is increasing. Since plants were placed in the northeast wing of the conservatory there have been daily visitors there, amounting, on pleasant Sundays, to between 100 and 200. The library is consulted almost daily by persons outside the Garden staff, and calls for the identification of plants, or for other botanical information, are becoming increasingly frequent.

Acknowledgments

The office accommodations and innumerable other courtesies so freely extended by the director and members of staff of the Central Museum since September, 1910, were continued until September, 1913, when the Garden offices were transferred to our new building. It is a pleasure to record here renewed expressions of appreciation of these courtesies.

The gift, by Mrs. Annie Morrill Smith, of her valuable herbarium of mosses, hepatics, and lichens, together with miscellaneous botanical publications and pieces of apparatus, is the largest single gift, with one exception, ever received by the Garden. For this, and also for other gifts of herbarium material by Mr. Harold Wingate (Myxomycetes), Mr. D. G. Banks (Algae), Mrs. C. Strieff (Phanerogams), and Dr. R. M. Harper (Georgia plants), as recorded in detail in the appended reports of the curator of plants and the curator of public instruction (pp. 56 and 61), the Garden expresses its best thanks.

Grateful acknowledgment is also made of the gift to the library, by Prof. Dr. Julius von Wiesner, professor of botany in the Imperial University at Vienna, of separate reprints of all of his published papers now available, together with his portrait, and of books presented by Mr. Alfred T. White, Mr. George D. Pratt, and others as recorded in the appended report of the librarian (p. 65).

The thanks of the Garden are due to Mr. Dick S. Ramsey for the gift of four large century plants (*Agave americana*), said to

be about 35 years old; to James McCutcheon & Co., for an exhibition of flax and linen products; to the O. N. T. Thread Co., for an exhibit of cotton and cotton thread; and to the International Harvester Co., for a set of photographs of manila and sisal fiber and operations in rope making.

The generous gift, by Mr. Alfred T. White, of one thousand dollars, hereby gratefully acknowledged, has made possible the continuation of the *Leaflets* in a much improved form.

Financial Matters

Municipal Appropriation for Maintenance.—I append hereto a financial statement for the fiscal year 1913. The city appropriation, out of the tax budget, for maintenance for the year was $29,460, an increase of $3,629.43 over the amount appropriated for the preceding year. Most of this increase was owing to the appointment of new members of staff, including an assistant, curator of plant breeding, a librarian, and a laboratory assistant, and of several employees, including an engineer, a janitor, and a night watchman; made necessary by taking possession of our new building in September, and by the natural expansion of our work. So large an addition to our force at one time is not anticipated for the future. The total increase for salaries and wages over 1912 was $7,181.32, but there were decreases in other items, making the net increase as stated above.

Attention may be called to the fact that the entire furnishing of our building, including steel library stacks and steel herbarium cases, has been done without necessitating any special issue of corporate stock or of revenue bonds for this purpose.

Building Fund.—As shown in the appended financial statement (p. 73), there remains from the original authorization of corporate stock to the amount of $100,000 for buildings, an unexpended balance of $5,789.31.

Grading Fund.—The corporate stock appropriation of July, 1911, for grading, was $40,000, and the payments to John Connor, contractor for the first part of the grading, amounted to a total of $24,615.54, leaving an unexpended balance of $13,004.06. The completion of the grading of the area adjacent to Mt. Prospect reservoir will require a sum in excess of this balance.

Private Funds.—Income from the George C. Brackett memorial fund, amounting to $25 annually, became available this year for the first time, and $17.17 has been expended for botanical books in English, in accordance with the expressed preference of the donors. In addition to endowment incomes, the Garden has received the sum of One Thousand Dollars by special contribution. The total income for the year from endowment and gifts amounted to $3,569.90, most of which, together with a balance of $1,817.52 from 1912, was expended for the library, the herbarium, lantern slides and negatives, the publication of the *Leaflets,* and other purposes directly related to the scientific and educational work of the Garden.

The Needs of the Garden

Children's Garden Space.—In connection with our course for teachers of children's gardens, it is essential to have about one acre of ground to be used for experimental and for demonstration purposes, but it would be very difficult to assign for this purpose so large an area from our present territory. If park lands adjacent to the Botanic Garden shall become available for Garden purposes, a portion of it should be devoted to this work.

Three types of gardens are proposed:

1. A pupil-teacher's garden, where those who are preparing themselves to teach in children's gardens may secure practical experience in the gardening operations to be later taught to others.
2. A practice garden, where pupil-teachers may obtain their first experience in conducting garden classes, under the supervision of a competent critic.
3. A model garden, conducted by those in charge of the normal course, with children chosen for their demonstrated ability and aptitude in gardening work.

By this arrangement, three essential ends will be secured: (1) Actual experience by the prospective teacher in carrying through all the operations and solving all the problems that will later confront the pupils; (2) An opportunity for practice work with classes, under expert supervision; (3) An opportunity to observe

the work and results of a garden conducted by teachers of experience with pupils of ability, and which will serve not only as a model of what may be accomplished, but also as an inspiration to the highest practicable attainment in one's own work.

So far as the writer knows, there is offered nowhere in the United States an opportunity for so thorough and practical a preparation for teachers of children's gardening as is implied in the plan here outlined. The work, however, is of vital importance, educationally and socially, and is worthy of the most thorough preparation.

Experimental Grounds.—Experimental work in plant breeding and along various other lines makes very urgent the setting aside of an area of about one acre for this purpose. In addition to being essential in research work, the cultures of pedigreed plants, and other plantings within this area, would be of great educational value to visitors interested in problems of heredity, evolution, plant disease, and the improvement of commercial plants.

Propagating House and Nursery.—In the First Annual Report of the Garden* attention was called to the fact that, as soon as our conservatories were completed, their entire space will be needed for exhibition collections, and the work of instruction and investigation. I beg to quote here, as still pertinent, the last two sentences of the paragraph cited:

> "It is already clearly evident that, within a very short time after the completion of our plant houses, their entire space will be needed for our exhibition collections, and the work of instruction and investigation to which two of the houses are now assigned. This will necessitate the erection of a propagating house where the collections may be suitably prepared and cared for, and it will also become increasingly urgent that we have a garden area adjacent to the propagating house for nursery and experimental purposes."

Urgent Need of Additional Building.—As stated in my quarterly report for the period ending September 30, 1913, the organization and equipment of the Garden, and the acquisition of scientific and teaching equipment had proceeded to such an extent that we had quite outgrown the capacity of the first section of the new building before we took possession of it. The need for the second

* Brooklyn Bot. Gard. Record 1: 44. Ap 1912.

section is already very pressing. The five private research rooms contained in the first section are being occupied for offices; the room intended for an elementary laboratory is occupied by the library; and the physiological laboratory room, largely by the herbarium. There is no auditorium available for the giving of public lectures or the holding of public assemblies of any considerable size. The only room available for an audience will not seat more than about 60 persons. For this reason, we are unable to inaugurate certain lines of public instruction for which we are fully equipped in the matter of staff and in all other ways. The need of additional storage room in the basement is very pressing, as is also the need of at least one more class room, and a laboratory room.

The importance of completing the conservatories may also be urged at this time. The acquisition and proper installation of our conservatory collections will be delayed and hampered until our conservatories are completed. The need of the service basement underneath the two south wings of the conservatories is also becoming increasingly urgent.

Municipal Appropriation for Maintenance.—The City of New York has been most liberal with the Garden in the matter of annual appropriations for maintenance, yet for a new institution, projected along broad lines, and growing vigorously, the appropriations have not been large. In fact, it is only by an economy so rigid as to imperil efficiency that the Garden can now be run with the sum annually appropriated by the city, and this is made possible only by the devotion of a loyal and enthusiastic, as well as efficient, staff. In the matter of salaries, it may be noted that the salaries paid to members of the Garden staff are not high for the class and character of the services rendered. The salaries of our highest paid positions, the curatorships, are less than the salaries paid in our best colleges and universities, less, even, than the salaries of assistant teachers in the high schools of New York City, and very much less than the salaries of first assistants (heads of departments) in the high schools. This is neither appropriate nor commensurate with the preparation, experience, and reputation demanded of the incumbents, and should be regarded only as a temporary condition, to be improved at the earliest possible date.

Private Funds.—To anyone in close touch with the situation, it is self evident that we shall not be able to expand at all, beyond their present proportion, the educational and scientific work for which the Garden was primarily established, but that on the contrary, we shall be obliged to retrench, unless some plan is devised and put into early operation for substantially increasing our regular annual income, in addition to the income from our present endowment.

I have, heretofore, at various times in quarterly reports and elsewhere, set forth the present needs of the Garden for additional income from private funds. A restatement of this information is given below in tabulated form:

ESTIMATED ANNUAL NEEDS OF THE GARDEN FROM PRIVATE FUNDS

	Annually after 1915	1914–1915
Urgent:		
1. Living plants	$ 500	$ 800
2. The Library (including binding)	800	1,500
3. The Herbarium (specimens, material, care)	800	1,000
4. Scientific publications	800	1,000
Illustrating:		
5. Lantern slides, negatives, prints, cuts	300	300
6. Photographer at $25 a month (part time)	300	300
7. Pen artist at $25 a month (part time)	300	300
8. Leaflets (printing and mailing)	350	300
9. Motion picture camera and apparatus, and rental of films (from 1915 only)	100	300
10. Botanical exploration for American plants for the living collections and trips in connection with investigations	750	1,000
Total estimated annual needs	5,000	6,800
Present income from endowment	2,500	2,500
Balance not provided for	2,500	4,300
Very desirable:		
11. Study collection to loan to schools	200	200
12. Prizes for botanical work of merit by school pupils	50	50
13. Public scientific lectures by noted botanists	200	200
14. Research fellowships at $500.		
15. Research curatorships at $3,000.		

Accompanying Papers

The annual reports of the curator of plants, the curator of public instruction, and the librarian, and the agreement between the Botanical Society of America and the Garden concerning cooperation in the publication of the American Journal of Botany, are appended as parts of this report.

Respectfully submitted,

C. Stuart Gager,
Director of the Garden.

REPORT OF THE CURATOR OF PLANTS FOR 1913

Dr. C. Stuart Gager, Director.

Sir: I have the honor to submit herewith my report as Curator of Plants for the year ending December 31, 1913.

1. General Maintenance and Construction Force

As in the past, this force has carried on all laboring work such as grading, rockwork, mowing, cleaning, et cetera. The force worked from March 17 to November 21 inclusive, averaging 9 men for most of the season, but in the spring and autumn averaging 15–18. The average number for the season actually working on the force was 11. Counting foremen and gardeners, the average total of men to care for the grounds and plants is 15, which is very small compared to the ideal of 1 man per acre that it would be desirable to maintain. To the gardening force there were transferred 2 men for 150 working days during the busy seasons.

The chief work carried on by this force during the year was the painting of the fence on the Washington Avenue and Flatbush Avenue sides of the Garden, about 3,600 ft.; construction of small brook, spring and bog in Section VI.; the building of a retaining wall near the northwest end of the lake; excavating the beds for the herbaceous garden on the central meadow; excavating for new water connection in Washington Avenue, and along the fence near it; building and sodding the banks along the upper end of the brook, when the latter area was turned over to us by the grading

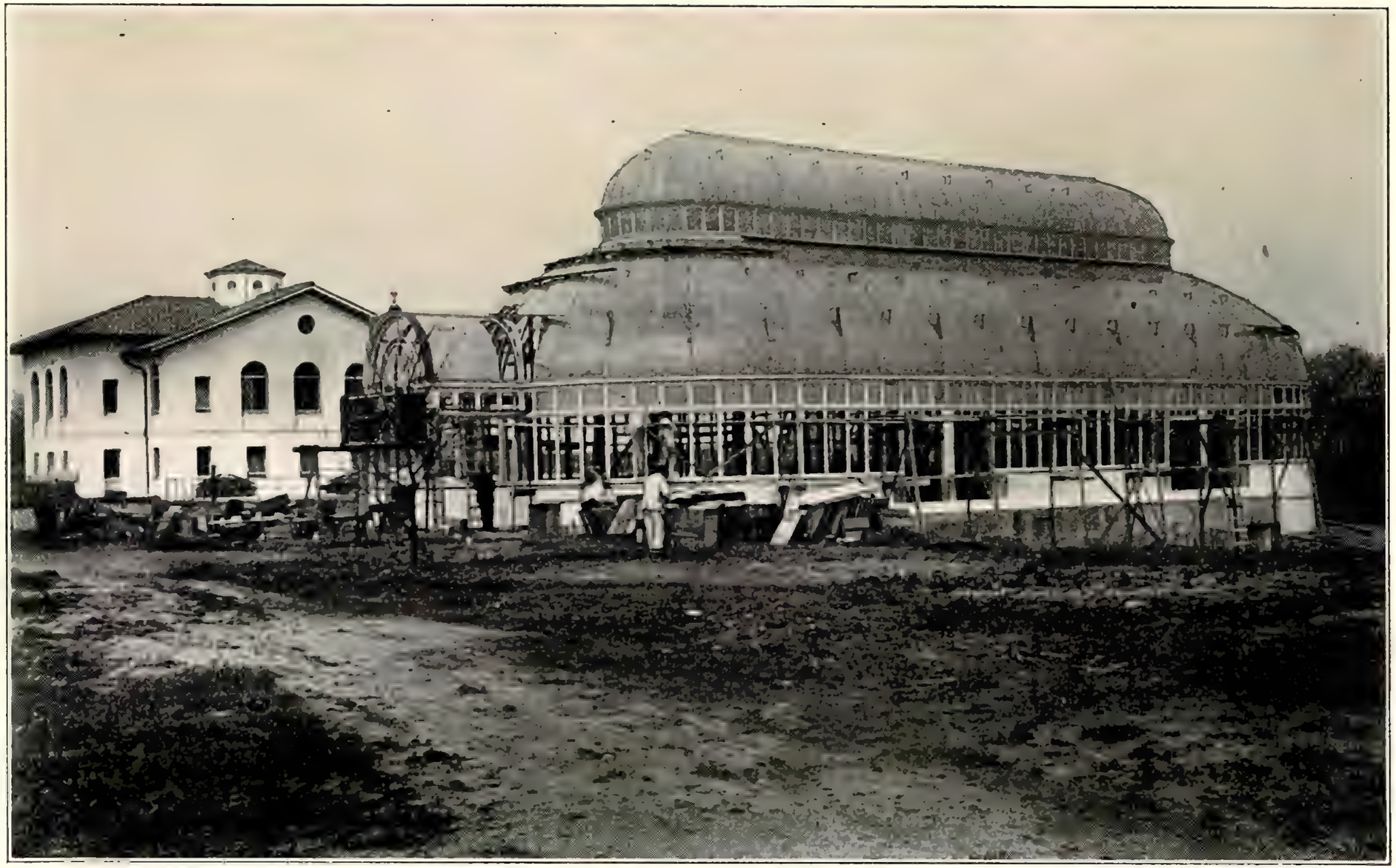

FIG. 3. Conservatories of the Brooklyn Botanic Garden. Second section under construction. November 14, 1913.

contractor; cutting of trees in Prospect Park, incident to grading operations there; enlargement of the bog in Section II; handling of hundreds of boulders which have been hauled to the site of the proposed rockery; and remaking the lawn in the center of the Local Flora Section. Besides this the force has continued in such general maintenance work as occasion demanded. This force has been in immediate charge of Mr. Herman Kolsh, foreman.

Gardening Force

During the season, this has consisted of two gardeners under the supervision of Mr. J. V. Borin, head gardener. It has been augmented during the busy season by 2 men for 150 working days from the laboring force. To the department of public instruction, to the curator of plant breeding, and various activities not under my supervision, there has been assigned an average of one gardener for 46 working days. As this extra work began in the former case only on October 23, and in the latter case in the middle of June, we must count on a much increased amount of such work during the coming year. This, with the ordinary growth of our collections, will necessitate another gardener during 1914.

Additions have been made to Sections II, the Pinetum, and the Nursery collections, and some shrub planting for Section VI, although most of this section could not be planted on account of grading operations.

The ecologic section (IV) was partially installed on the west side of the brook, in the central meadow, 21 beds having been made and partially planted from outlines prepared by you.

The largest single collection to be started during the year was the herbaceous planting of the general systematic collection. The layout of these beds was planned by the consulting landscape architect, Mr. Caparn, from specifications prepared by me, and of the total of 31,474 sq. ft., estimated for the completed collection, 12,764 sq. ft. of beds were made and partially planted during the year. As yet no woody plants, except willows, have been added to this collection.

During October the first section of the greenhouses was turned over for use, and the beginning of a general systematic collection

has been installed. Of the four houses, two are available for this, the other two being used for experimental work and for the department of public instruction. There are now about 250 plants in the collection, representing about 140 species, mostly the gift of the New York Botanical Garden.

In the autumn an addition of 132 species from the E. H. Wilson collections from China was purchased from the Arnold Arboretum. These, with the collection mentioned in my last annual report, will, it is hoped, be permanently planted in the spring of 1914.

Labelling and Other Clerical Work

During the year about 600 show labels have been made and about 30 signs painted. This work has been done by our own force and the very unsatisfactory scheme of letting such work by outside contract avoided. During the coming year, as the collections enlarge and become verified as to name, it is anticipated that a large number of labels will be made.

During the year I have had as assistant Mr. Cullen Adlerblum, who has attended to the details of accessioning, the collection of herbarium specimens on the grounds, and the clerical work incident to the proper maintenance of the records. The following table indicates the number of accessions of living plants added during the year, and the total number of accessions to date.

By purchase	924
By exchange	18
By gift	308
By collection	97
Total for 1913	1,347
Previously accessioned	2,512
Grand total	3,859

Accession numbers 2,513–3,859 were assigned during the year. There are now in the general systematic collections of the garden 804 genera and 3,105 species.

Phanerogamic Herbarium

During the year the Garden has made many additions to its herbarium. As this is the first report of this collection, it seems desirable to record its chief sources, and the estimated number of specimens now on hand.

ACCESSIONS OF PTERIDOPHYTA AND SPERMATOPHYTA, 1911–1913, INCLUSIVE

1911		
Local Herbarium of Norman Taylor, presented	1,000	1,000
1912		
Collected by the staff	100	
Collected on grounds and added to Cultivated Herbarium	350	
Herbarium of E. W. Olive, presented	1,000	
		1,450
1913		
Collected by staff	50	
Collected on grounds and added to Cultivated Herbarium	734	
Herbarium of H. Dautun, purchased	30,000	
Herbarium of A. A. Heller, purchased	10,000	
Transferred from the Museum (Herbarium, Dept. of Bot., B. I. A. S.)	30,000	
Herbarium of W. M. VanSickle, purchased	4,000	
Local Ferns collected by P. Dowell, purchased	60	
Local Oaks collected by P. Wilson, purchased	20	
Collections from herbarium of A. S. Hitchcock, purchased	1,450	
Herbarium of R. M. Harper, presented	653	
European collections of Mrs. C. Strieff, presented	250	77,217
		79,667

About one half of this material is mounted, and the rest is being mounted as rapidly as possible. The herbarium is being arranged in alphabetical sequence so far as genera and species are concerned, the sequence of families being, of course, that of Engler and Prantl.

Personal Activities

During the first week in May, I visited the serpentine barrens of Chester Co., Pa., for the purpose of study and the collection of specimens. Four days, from May 29–June 2, were spent in

similar work at Montauk and Amagansett, L. I.; on this occasion I acted as guide for a field trip planned by the Department of Botany of the Institute. The Arnold Arboretum was visited on November 10 and 11, and from there I went to Pen Yan, N. Y., to inspect the herbarium of S. Hart Wright, offered for sale, returning on November 15.

I have continued the editing of *Torreya,* and my studies on the local flora are now practically ready for printing. They will appear as a Memoir of the New York Botanical Garden, where the work was started in January, 1909. Since my appointment here I have completed the work, much of which has been done at the New York Garden. For the many courtesies of the director and staff of that institution I here gratefully express my appreciation.

Outside activities, carried on in other than Garden time, include botanical reviewing for the *Nation* and the *Evening Post,* and the preparation of over three hundred articles for Bailey's Standard Cyclopedia of Horticulture.

Respectfully submitted,

NORMAN TAYLOR,
Curator of Plants.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1913

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit herewith my report as curator of public instruction for the year ending December 31, 1913.

One of the most popular features of the educational activities undertaken during the past year has been the *Leaflets,* issued weekly or bi-weekly during the months of April, May, June, September and October. In the first series, there were issued in all fourteen numbers, eleven of which were four-page bulletins, three were eight-page. The many requests for extra copies and the consequent rapid exhaustion of the greater part of our supply of *Leaflets* shortly after they were published, testifies to the success of this means of presenting popular and elementary information on botanical subjects and on nature study to the friends of the Garden, and to the teachers and pupils of our local schools.

The department of public instruction has been particularly fortunate in having had added to the staff during the past fall Miss Ellen Eddy Shaw, who has had large experience with the organizing of the school garden and nature study movements in the east. To her experience as a writer on garden topics and nature study, and to that gained by some years of enthusiastic and sympathetic teaching of these subjects, Miss Shaw adds the prestige gained from her official connection with the School Garden Association of America, the New York City Chapter of the National Nature Study Association, and the National Plant, Flower, and Fruit Guild.

Since September, when Miss Shaw assumed her duties at the Garden, the work of active cooperation with local schools has made most promising progress. Moving into our unfinished laboratory building in late September, we were enabled almost immediately to start this educational work in a modest way. The first work began in October, when Miss Shaw, in response to a request from the Girls' High School, started a course on the planting of bulbs, with two classes from that school. In November another class from the same school, under the supervision of Miss Shaw, began to use the greenhouse and laboratory facilities at the Garden to study methods of plant propagation. This work will continue until February, 1914. Still another class, taught by their teacher, Miss Goodrich, came to the Garden at regular intervals for lessons on the propagation of plants by seeds and cuttings. At irregular intervals, the teachers of the Girls' High School and other schools have taken field trips to the Garden for the purpose of studying methods of pollination, seed dispersal, and other topics.

Classes were also organized by Miss Shaw during the fall for children from neighboring elementary schools: one for small boys and girls on Tuesday afternoons, two for older girls on Saturday mornings and afternoons, and another for boys on Saturday mornings.

A course of five lectures on Indoor Plant Culture, primarily for adults, was inaugurated by Miss Shaw on October 22. Forty-six persons registered in this course.

Also during the fall there was worked out a prospectus of courses to be offered by the department of public instruction and

by other members of the staff of the Garden.* These courses include three for children in children's gardens and nature study; six in household botany and horticulture; one in elementary systematic botany; nine in a course for the training of teachers of school gardening; and ten in advanced botany and investigation, making twenty-nine courses in all.

With a view to ascertaining the best methods of serving the local schools, Miss Shaw made a number of visits to neighboring schools for conferences with the principals and others on methods of cooperation; while various members of the staff have been often called in consultation with high school teachers, boy scouts and their officers, the local officers of the National Plant, Flower and Fruit Guild, and others. We have been called upon a number of times to serve as judges in Children's Farm Garden contests, in flower and vegetable exhibits and as examiners in Boy Scout examinations.

On September 16 and 24, at the request of Mr. Willis B. Holcombe, executive secretary and commissioner of the Brooklyn Council of the Boy Scouts of America, conferences were held at the Garden between Mr. Holcombe, the curator of public instruction, the curator of plants, the instructor, and the director of the Garden, on the requirements in forestry, botany, and gardening for various scout badges. The conference was in preparation for a revision of the requirements in these subjects in the scout manual.

Miss Shaw has spent much time in securing gifts of material from dealers, manufacturers and others, to be used later to illustrate public lectures to school children and to adults, on useful plants and allied topics.

Among the public lectures given by Miss Shaw have been those to parents' clubs at Woodmere, L. I., at Bethany settlement house, to the public school teachers at Hackensack, N. J., and to the pupils of the Ethical Culture School of New York, and of Woodmere Academy. Her writings on botanical, garden, and nature study topics, since she assumed her position at the Garden, have been written largely in connection with her work as editor and contributor of the "Young Folks' Garden" department of the *Garden Magazine,* of the "Nature" department of

* See Brooklyn Botanic Garden Record 3: 1–9. Ja 1914.

Country Life in America, and as managing editor of the National Plant, Flower and Fruit Guild Magazine. The curator of public instruction has given eight public lectures and addresses before high schools, scientific societies and various other organizations during the past year; besides conducting field meetings and excursions for the Department of Botany of the Brooklyn Institute at Queens, L. I., and for pharmacists of New York City at the Brooklyn Botanic Garden. The week from December 28 till January 2, 1914, I spent in Atlanta, Ga., in company with the director, attending the meetings of the American Association for the Advancement of Science and those of the affiliated Botanical Society of America and the American Phytopathological Society. Two papers by members of the staff of the Garden, Dr. White and Mr. Bisby, were read at these meetings.

The meetings of the seminar of the Garden staff and invited members were resumed on November 6 and continued fortnightly throughout the year. A Journal Club, founded for the purpose of reviewing and keeping in touch with current botanical literature was also organized late in the fall, meeting biweekly, on Mondays, alternating with the seminar. Teachers of botany in local schools, and others who might be interested, were invited to join in this stimulating activity.

The Cryptogamic Herbarium

That part of the herbarium embracing the mosses, hepatics, lichens, fungi and algae having been placed in charge of this department, I include in this report a tabular list of acquisitions of these plants so far received, together with data concerning their numbers, and source. This herbarium, as well as the larger herbarium of ferns and seed-bearing plants, have, during the short time since they have been accessible in our new building, been consulted by a number of teachers and others. It is anticipated that they will be much utilized outside of our own staff, as soon as we complete their arrangement into a permanent, usable system. A special point in this connection, perhaps worthy of note, is our use of a vertical filing system for the fungous herbarium. There can be no doubt of the greater convenience and greater ease of consultation with this vertical system, which also seems to afford much greater economy of space.

As will be seen from the tabular list below, we are indebted to various friends of the Garden for generous gifts of herbarium material, which have thus rendered our collections, at the very outset, of considerable value for consultation and use in scientific investigation. In particular, the valuable gift, by Mrs. Annie Morrill Smith, of her collection of mosses, hepatics and lichens, has given us an admirable foundation on which to build; in addition, the fungous collection of the Department of Botany of the Brooklyn Institute, as well as the gifts of Mr. Harold Wingate and Mr. D. G. Banks have helped form a valuable nucleus for our cryptogamic herbarium.

ACCESSIONS TO THE CRYPTOGAMIC HERBARIUM TO DECEMBER 31, 1914

By Transfer

From the Herbarium of the Department of Botany of the Brooklyn Institute of Arts and Sciences:	Mosses	5,000	specimens.	
	Hepatics	50	"	
	Lichens	400	"	
	Algae	1,800	"	
	Fungi	1,500	"	8,750

By Gift

From Mrs. Annie Morrill Smith, Brooklyn, N. Y.:	Mosses	10,124	"	
	Hepatics	649	"	
	Lichens	1,019	"	11,792
From Mr. Harold Wingate, Brooklyn, N. Y.:	Myxomycetes	150	"	
From miscellaneous sources:	Myxomycetes	200	"	
From Mr. D. G. Banks, Sea Cliff, L. I.:	Long Island Algae	100	"	450

By Purchase

From Mr. Elam Bartholomew, Stockton, Kansas:	Fungi Columbiani.	2,200	"	
	N. Amer. Uredinales	800	"	
From Mr. A. O. Garrett, Salt Lake City, Utah:	Fungi Utahenses	200	"	
From Dr. J. F. Brenckle, Kulm, N. Dak.	Fungi Dakotenses.	250	"	
From Miss Gertrude S. Burlingham, Brooklyn, N. Y.:	Lactarieae of North America	50	"	3,500
Total				24,492

Among the lantern slides added to our educational equipment during the past year are some illustrating tea culture, bought from the U. S. Department of Agriculture; some on cotton manufacture donated by the O. N. T. Spool Cotton Company; others illustrating twine manufacture, donated by the International Harvester Company. 506 lantern slides were accessioned during the past year, of which 245 were colored, the coloring being done in large part by Miss E. M. Kittredge.

It is quite obvious that we cannot undertake a very ambitious program of botanical or nature study education in our present cramped quarters, and it is hoped that an extension of our present building may soon be provided for, as well as more gardening space for the important work projected along the line of school gardens.

Respectfully submitted,
EDGAR W. OLIVE,
Curator of Public Instruction.

REPORT OF THE LIBRARIAN FOR 1913

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit herewith my report as Librarian from the date when my appointment took effect, September 1, 1913, to December 31, 1913.

On September 26 the library was installed in the large west room on the main floor of the laboratory building. This room, which is to be used ultimately as an elementary laboratory, makes a very convenient library. It has been furnished with six open end Library Bureau book stacks, an accession shelf, a twenty tray Library Bureau standard cabinet, for catalog purposes, and nine "elastic" book units. Additional shelves have been put in the Library Bureau unit wood stack, thus making a very convenient periodical case. Four tables, twelve chairs, and a librarian's desk and chair complete the equipment.

The books were broadly classified and placed at once upon the shelves in order to make them available for immediate use. The unbound material was sorted, tied in bundles, roughly classified, and arranged in alphabetic order. A list of all duplicates was made on library cards. The duplicates number 446 pieces.

FIG. 4. Grading operations between Mt. Prospect Reservoir and the Central Museum. First contract. November 14, 1913.

Ninety-five volumes of periodicals have been collated and made ready for the binder. Eighty-seven pamphlets have been put into pamphlet binders.

The collection of photographic negatives and lantern slides has been cataloged. The collection numbers 1059 negatives and 946 lantern slides, colored and uncolored. The entries have been made on cards printed with a special form designed at the Garden for this purpose. Twelve hundred (1,200) cards have been written and are ready to be filed.

The set of index cards of Agricultural Experiment Station literature numbers 5,693, and the filing of these cards has been started. The books most in demand for the work of the herbarium have been deposited in that room, in order to facilitate the work, and the classification and cataloging have been started.

During the summer, I visited the New York Botanical Garden Library and spent some time at the Missouri Botanical Garden Library, with a view of devising a scheme for the classification of our library. I also consulted the various classifications of botanic literature that have been published and several that were submitted to us in manuscript.

Feeling convinced that the important factor in the arrangement of such a library is simplicity, and that the classification of the books need not be an index to the science, I drew up a classification and submitted a copy to each member of the Garden staff. Some time afterward, we met to discuss the classification and after altering a few details, it was adopted.

The following is an outline of the main topics on which the classification is based:

Outline of Classification for the Library

000 Miscellaneous works of botanic interest.
100 Paleobotany.
200 Distribution of plants. Publications arranged geographically.
300 Nomenclature, classification, systematic botany, families, genera and species, arranged alphabetically.
400 Morphology and organography.
500 Physiology.

600 Economic botany.
700 Horticulture, and gardening.
800 Forestry.
900 Variation and heredity.
Society publications in one alphabet.
Periodicals in one alphabet.

* * *

The income from the Brackett fund for the purchase of books in English became available for the first time. It was expended for books to be used in connection with the elementary instruction. These books are most attractive, and form the nucleus of what will in time become a very necessary collection, in connection with our elementary instruction.

Among the most valuable additions to the library during 1913 are the complete set of Curtis's Botanical Magazine, 139 volumes, deposited with us by the Brooklyn Public Library, and the *Index Kewensis,* presented by Mr. George D. Pratt.

The library also appreciates the gift of two rare and historically interesting volumes presented by Mr. Alfred T. White. The first is a copy of *Musaeum Tradescantianum;* or, A collection of Rarities preserved at South-Lambeth near London by John Tradescant. Lond. 1656. The second volume is a copy of The American Physitian; or, A Treatise of the roots, plants, trees, shrubs, fruit, herbs, etc., growing in the English Plantations in America. Describing the Place, Time, Names, Kindes, Temperature, Vertues and Uses of them, either for Diet, Physick, etc., Whereunto is added a Discourse of the cacao-nut-tree, and the use of its Fruits; with all the ways of making Chocolate, The like never extant before. By W. Hughes. Lond. 1672.

Further acknowledgment is hereby made of the following gifts:

Mr. Alfred T. White	56 Volumes.
Mrs. J. R. McCay	31 Volumes.
Mr. George D. Pratt	4 Volumes.
Mrs. Annie Morrill Smith	158 Unbound periodicals and pamphlets.
Dr. N. L. Britton	1 Volume.
Mr. J. V. Borin	1 Volume.
Amer. Scen. & Hist. Pres. Soc..	2 Volumes.
Mr. W. A. White	1 Volume.
Dr. C. S. Gager	1 Volume, and numerous pamphlets.
Dr. E. W. Olive	1 Volume.
Prof. Dr. Julius von Wiesner ..	72 Separata and 1 portrait.

The following library material was transferred from the Brooklyn Institute Museum Library:

Bound volumes	442	
Unbound books, numbers and parts, exclusive of "Pamphlets"	447	
Pamphlets	63	
Total		952
Catalog cards	978	
Torrey Botanical Club cards:		
Filed	17,726	
Unfiled	840	
Total		18,566

We are at present receiving 63 periodicals,—43 by subscription; 7 by gift; 9 by exchange; 4 by transfer from Brooklyn Institute Museum Library.

Our library is not a circulating library, but it is open free for consultation to all persons, from 9 A. M. to 5 P. M. daily, except Sundays and holidays. This privilege has been used by an increasing number of persons not officially connected with the Garden. It is hoped that as the Garden and Library become better known, the Library will become an active center for botanical reference work in the Borough of Brooklyn.

The following summary of publications and cards now possessed by the Library may be made:

SUMMARY

Total number of bound volumes, December 31, 1912		519
Added by purchase during 1913	372	
Added by gift	116	
Added by exchange	42	
Added by transfer from Brooklyn Institute Museum Library	442	
Deposited by Brooklyn Public Library	139	1,111
Total number of bound volumes, December 31, 1913		1,630
Current periodicals regularly received:		
By subscription	43	
By gift	7	
By exchange	9	
By transfer from Museum Library	4	63
		63

Index cards of Agricultural Experiment Station literature,		
December 31, 1913	5,434	
By purchase during 1913	259	5,693
Torrey Botanical Club cards:		
By transfer from Museum Library:		
Filed	17,726	
Unfiled	840	18,566
		18,566
Negative and lantern slide catalog cards:		
During 1913	1,200	1,200
		1,200

Previous to September 1, 1913, the office of librarian was combined with that of secretary of the Garden. I take pleasure in acknowledging the excellent work done in the initial organization of the library, and wish to thank the former librarian, Miss Eves, for generous assistance and council at the inception of my work.

Respectfully submitted,

HELEN VIRGINIA STELLE,
Librarian.

FINANCIAL STATEMENTS FOR 1913

I. MUNICIPAL ACCOUNT FOR 1913

Code No.			
1846	*Personal Service:*		
	Appropriation		$22,060.00
	Expended		22,059.89
	Balance		.11
1847	*Fuel Supplies:*		
	Appropriation		300.00
	Expended	$ 295.71	
	Transferred to 1853	4.29	300.00
1848	*Office Supplies:*		
	Appropriation		750.00
	Transferred from 1849	135.51	
	Contributed from Surplus Fund	11.00	146.51
			896.51
	Expended		896.32
	Balance		.19

1849	*Botanical and Agricultural Supplies:*			
	Appropriation			1,900.00
	Contribution from Surplus Fund			5.20
				1,905.20
	Expended		1,100.91	
	Transferred to			
	1848	$135.51		
	1852	659.09		
	1856	9.60	804.20	1,905.11
	Balance			.09
1850	*General Plant Supplies:*			
	Appropriation			250.00
	Contributed from Surplus Fund			.40
				250.40
	Expended		74.70	
	Transferred to 1853		175.68	250.38
	Balance			.02
1851	*Office Equipment, Purchase of:*			
	Appropriation			200.00
	Transferred to 1853			200.00
1852	*General Plant Equipment:*			
	Appropriation			2,050.00
	Transferred from 1849		659.09	
	Contributed from Surplus Fund		14.20	673.29
				2,723.29
	Expended			2,723.21
	Balance			.08
1853	*Repairs and Plumbing:*			
	Appropriation			500.00
	Transferred from:			
	1847		4.29	
	1850		175.68	
	1851		200.00	
	1854		91.75	
	1857		81.32	
	1858		50.45	
	1860		50.00	653.49
				1,153.49
	Expended			1,153.36
	Balance			.13

1854	*Lighting Public Buildings:*		
	Appropriation		100.00
	Contributed from Surplus Fund		6.46
			106.46
	Expended	14.71	
	Transferred to 1853	91.75	106.46
1855	*Hire of Horse and Wagon with Driver:*		
	Appropriation		500.00
	Expended		500.00
1856	*Carfare:*		
	Appropriation		25.00
	Transferred from 1849	9.60	
	Contributed from Surplus Fund	2.30	11.90
			36.90
	Expended		36.81
	Balance		.09
1857	*Express and Deliveries:*		
	Appropriation		375.00
	Contributed from Surplus Fund		5.40
			380.40
	Expended	299.07	
	Transferred to 1853	81.32	380.39
	Balance		.01
1858	*Telephone Service:*		
	Appropriation		100.00
	Credit on service for 1912		28.45
	Contributed from Surplus Fund		8.36
			136.81
	Expended	86.36	
	Transferred to 1853	50.45	136.81
1859	*Traveling Expenses:*		
	Appropriation		300.00
	Expended		299.94
	Balance		.06
1860	*Insurance:*		
	Appropriation		50.00
	Transferred to 1853		50.00

Summary:

Appropriated by City for maintenance	29,460.00
Contributed from Surplus Fund	53.32
Credit on telephone service, 1912	28.45
	29,541.77
Expended	29,540.99
Balance, December 31, 1913	.78

2. Private Funds Accounts for 1913

Endowment Fund, Income Account:

Balance, January 1, 1913	1,485.52
Income, 1913	2,500.00
Special contribution	1,000.00
	4,985.52
Expended	4,522.22
Balance, December 31, 1913	463.30

Special Contribution of 1912 for Library:

Balance, January 1, 1913	332.00
Expended	332.00

George C. Brackett Library Fund:

Income, 1913	25.00
Expended	17.17
Balance, December 31, 1913	7.83

Incidental Fund—Garden Office:

Received, 1913	33.90
Expended	26.25
Balance, December 31, 1913	7.65

Membership Fund (B. I. A. S.):

Received, 1913	11.00
Expended	0.00
Balance, December 31, 1913	11.00

Summary:

Balance, January 1, 1913	1,817.52
Income, 1913	3,569.90
	5,387.42
Expended	4,911.51
Balance, December 31, 1913	475.91

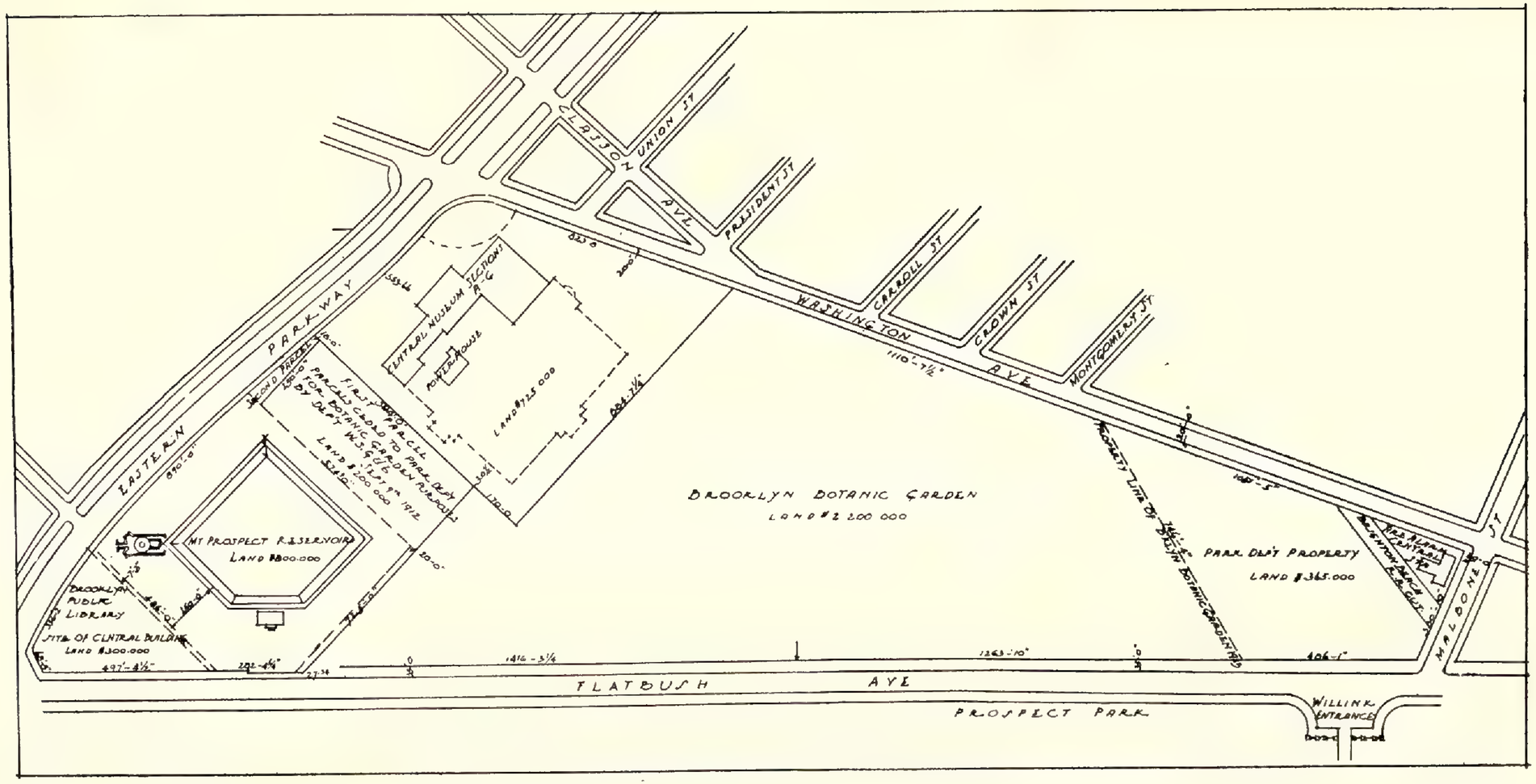

FIG. 5. Brooklyn Botanic Garden and environs, showing assessed valuation of property, 1913.

APPENDIX 1

RESOLUTIONS OF THE BOARD OF ESTIMATE AND APPORTIONMENT APPROVING TRANSFERS OF FUNDS TO THE AMOUNT OF $1,457.69, APPROPRIATED IN THE TAX BUDGET OF THE BROOKLYN BOTANIC GARDEN FOR 1913

Resolved, That the Board of Estimate and Apportionment, pursuant to the provisions of section 237 of the Greater New York Charter, hereby approves transfer of funds appropriated to the Department of Parks, Borough of Brooklyn, for the year 1913, as follows:

FROM

	Supplies	
1847	Fuel supplies	$ 4.29
1849	Botanical and agricultural supplies	804.20
1850	General plant supplies	175.68
	Purchase of Equipment	
1851	Office equipment	200.00
	Contract or Open Order Service, Light, Heat and Power	
1854	Lighting public buildings	91.75
	Transportation	
1857	Expressage and Deliveries	81.32
	Communication	
1858	Telephone service	50.45
	Fixed Charges and Contributions	
1860	Insurance	50.00
		$1,457.69

TO

	Supplies	
1848	Office supplies	135.51
	Purchase of Equipment	
1852	General plant equipment	659.09

Contract or Open Order Service

1853	General repairs	653.49

Transportation

1856	Carfare	9.60
		$1,457.69

Which was adopted at the meeting of the Board held on January 16, 1914. (*City Record* 42: 976. 29 Ja 14.)

APPENDIX 2

APPROPRIATIONS OF CORPORATE STOCK OF THE CITY OF NEW YORK FOR PERMANENT IMPROVEMENTS, AND EXPENDITURES THEREFROM DURING 1913

BUILDING ACCOUNT

Appropriated			$100,000.00
Expended:			
First Section (laboratory building and conservatories):			
Cockerill & Little Co.....	$58,132.99		
Wahle Phillips (lighting fixtures).	284.90		
Flatbush Gas Co. (lamps).....	23.80		
Lord Electric Co. (wiring and connections)	197.00	$58,638.69	
Second Section (palm house):			
John R. Sheehan & Co. (general)..	25,486.00		
Blake & Williams (heating plant)..	2,847.00		
Altman Plumbing Co. (plumbing).	614.00		
Lieberman & Sandford Co. (metal screens)	125.00	29,072.00	
McKim, Mead & White (architects' fees, based on cost of entire building)		6,500.00	94,210.69
Balance			$ 5,789.31

GRADING ACCOUNT

Appropriated			$ 40,000.00
Contract bid—first part:			
17,220 yds. @ 40 cts.....	$ 6,888.00		
35,552 yds. @ 36 cts.....	12,798.72		
12,638 yds. @ 39 cts.....	4,928.82		
Total	$24,615.54		
Expended:			
Grading contractor (John Connor):			
Earned	$24,265.76		
Deducted for delay, 7 days @ $25.00	175.00	$24,090.76	
Olmsted Bros. (landscape architects), 10 per cent. of $24,265.76		2,426.58	
Prints for specifications		3.60	
Services of engineer of Dept. of Parks		475.00	26,995.94
Balance			$ 13,004.06

APPENDIX 3

AGREEMENT BETWEEN THE BOTANICAL SOCIETY OF AMERICA AND THE BROOKLYN BOTANIC GARDEN CONCERNING THE PUBLICATION OF A JOURNAL OF BOTANY

1. In order to help finance the launching of a new journal of botany, the Brooklyn Botanic Garden guarantees to become responsible to the extent of not more than one hundred dollars ($100) an issue, for ten issues a year, and suggests that for the present, ten monthly issues (omitting August and September) constitute one volume.

2. The Botanical Society of America, as soon as the publication of the new journal is decided upon, agrees to advance a sum of not less than three hundred dollars ($300), to meet the necessary initial expense, and to contribute toward the maintenance of the journal, annually thereafter, and until notice to the contrary is served one year in advance, or until mutual agreement to the contrary, the income from its accumulated funds toward the cost of

publishing the journal; and the Botanical Society of America further agrees to assign annually a portion of the annual membership dues of each member, to an amount of not less than three dollars per member, as a subscription for the proposed journal, to be paid by the treasurer of the Botanical Society to the business manager of the journal.

3. It is further mutually agreed as follows:

(*a*) That, during the tenure of this agreement, the business manager of the journal shall be a member of the scientific staff of the Brooklyn Botanic Garden, that the undistributed copies of each number, and all the exchanges shall be deposited in the library of the Garden; and that the exchanges shall become the permanent property of the Garden. If, and whenever, at any time, the gross income of the journal, from all sources (including subscriptions, advertisements, the sale of back numbers and sets, and any subsidies or endowments), shall exceed the necessary expenses of publication, postage, stationery, etc., the surplus, either as principal or as interest on the same, shall be applied to improving the journal, either by increasing the number of pages, or the number or quality of the illustrations, or the quality of the paper, one or all, or in any other way, according as the editors and management may jointly agree; and the payment of an honorarium to contributors should be kept in mind as an end to be attained at the earliest possible date consistent with maintaining the magazine at a reasonable degree of excellence.

(*b*) That underneath the official name of the journal on the front page of the cover, and on the editorial or business page, there be printed the statement: "Official Publication of the Botanical Society of America"; and that the statement of publication, wherever printed, shall read: "Published in cooperation with the Botanical Society of America, by the Brooklyn Botanic Garden, at (address of printers)."

(*c*) That the editorial board, which shall control the general editorial policy, shall (with the exception of one member to be appointed by the Brooklyn Botanic Garden, in addition to the business manager) be elected by the Botanical Society of America under such terms and conditions, and at such periods as said Society may formally determine.

(*d*) That the agreement, to be entered into as above, shall remain in force for not less than three years; and that it may be terminated by either party only after written notice of intention to terminate shall have been given to the proper official, at least one year in advance.

(*e*) That in case, and when, the agreement shall terminate, the Botanical Society of America shall have possession of the reserved copies of the journal and shall have the right to the name of the journal; but the Brooklyn Botanic Garden shall retain ownership of the exchanges already received, and of such numbers of incomplete volumes of exchanges as are necessary to complete the current volumes.

For Botanical Society of America:

(Signed) F. C. NEWCOMBE,
GEORGE T. MOORE,
DUNCAN S. JOHNSON,
L. R. JONES,
R. A. HARPER,
Committee on New Journal.

For Brooklyn Botanic Garden:

(Signed) C. STUART GAGER,*
Director of the Botanic Garden.

* The director of the Garden was authorized to execute the above agreement on behalf of the Garden at the meeting of the Committee on Botanic Garden of the Board of Trustees of The Brooklyn Institute of Arts and Sciences, held on November 11, 1913.

The Brooklyn Institute of Arts and Sciences

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THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PROF. FRANKLIN W. HOOPER, *Director*

PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the Director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.

2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.

3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

7. *Studies of Teratological Phenomena in their Relation to Evolution and the Problems of Heredity. 1. A Study of Certain Floral Abnormalities in Nicotiana, etc.* 14 pages, figs. 4. 1914.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Current numbers free to all who wish them. Back series complete, 50 cts. each; back numbers, 5 cts. each.

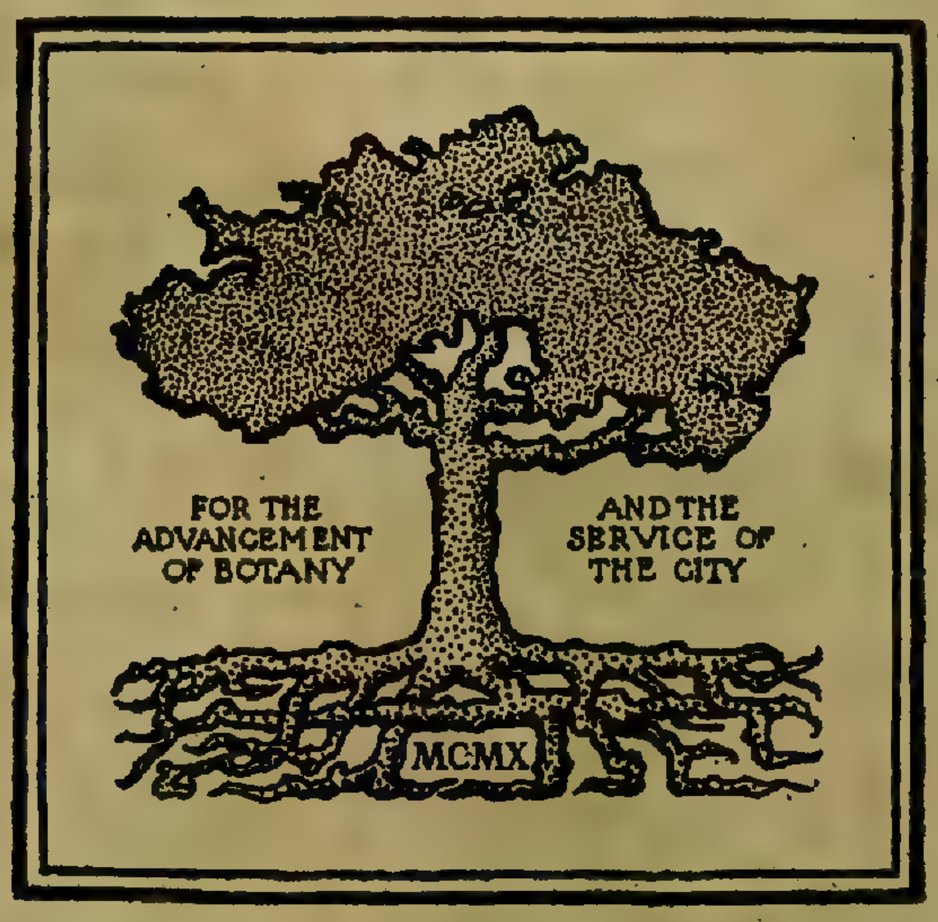
AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription rates: to members of the Botanical Society of America, $3.00 a year; to all others $4.00 a year.

BROOKLYN BOTANIC GARDEN

RECORD

VOL. III JULY, 1914 No. 3

EDITED BY
C. STUART GAGER



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under Act of August 24, 1912.

BOTANIC GARDEN STAFF

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DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

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MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

Iohannes Tradescantus Pater, rerum selectarum
insignem supellectilem in Reconditorio Lambethiano
prope Londinum, etiamnum visendam primus
instituit ac locupletavit.

Fig. 6. John Tradescant, father. By Hollar. From *Musaeum Tradescantianum*. London, 1656.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. III July, 1914 No. 3

A RARE BOOK BY TRADESCANT

In the January, 1914, number of the RECORD, was recorded the gift, by Mr. Alfred T. White, of a copy of the "*Musaeum Tradescantianum: or, a Collection of Rarities. Preserved at South-Lambeth neer London by John Tradescant. London, Printed by John Grismond, and are to be sold by Nathanael Brooke at the Angel in Cornhill, M.DC.LVI.*"

At the time of the publication of this book, Tradescant's museum was considered to be the most extensive one in Europe, but, on account of its poor arrangement, its scientific value was greatly diminished. In this respect, it was, of course, not unlike other contemporary collections. Murray* states that exhibits of that period were "often badly placed, and were nearly always arranged in relation to their accidental and not to their distinguishing features. Things were disposed according to size, like pipes in an organ, and the two sides of a room had to balance, so that most incongruous objects were often placed alongside of each other." As interpreted by Murray, this condition was a reflection of the fact that the scientific ideas of that time "were too vague and ill-defined to lead to useful results." The scientific and artistic efficiency of modern museums has been a gradual growth, contingent upon the development of clearer and more accurate scientific thinking, the advancement of learning in general, and upon the application to museums of the modern ideas of organization and administrative efficiency.

* Museums: their history and use. Glasgow, 1904, pp. 206, 207.

Tradescant's museum was one of those heterogeneous collections of "rarities," reflecting the encyclopedic interests of scientific men of that period. This old type of naturalist is now rarely met with, being supplanted by the modern specialist, who is characterized rather by the depth than by the breadth of his interests and knowledge.

The table of contents, called "A view of the whole," includes such unrelated objects as birds with their eggs, four-footed beasts, divers sorts of strange fishes, shell-creatures, insects, minerals, "petrified things" and "choice stones," outlandish fruits from both the Indies, mechanicks, carvings, turnings, and paintings, "other variety of rarities," warlike intsruments, garments, "utensils and householdstuffe," numismata, and medalls—a veritable museum of science and art; concluding with the "*Hortus Tradescantianus, an enumeration of his Plants, Shrubs, and Trees both in English and Latine*"; and concluding (pp. 179–183) with "*A* Catalogue *of his Benefactors.*" The benefactors included King Charles and Queen Mary, George, Duke of Buckingham, William Laud, Archbishop of Canterbury, the Earl of Salisbury, and other royal and prominent persons.

Among the objects cataloged (p. 43) are, "A piece of the Stone of Sarringe-Castle where *Hellen* of *Greece* was born; A piece of the Stone of the Oracle of Apollo; A piece of the Stone of *Diana's* Tomb; An Orange gathered from the Tree that grew over *Zebulon's* Tombe." These objects indicate, not alone the non-scientific character of the early museums, but the contemporary credulity, and un-scientific habits of thought. This notion of the nature and purpose of a museum, as a cabinet of oddities, of the curious, the unusual, and the amazing or amusing, rather than of the fundamentally instructive, has had great vitality and inertia. During the preparation of this article, the writer was interviewed by a reporter of one of the largest and most widely known daily papers of New York. The reporter appeared genuinely surprised and even somewhat disappointed to learn, in response to his query, that the purpose of a Botanic Garden is not primarily to exhibit botanical curiosities, "the wonders of plant life."

On page 41 of the volume under review, we learn that the author's collection contained, "A Book of Mr. Tradescant's

choicest Flowers and Plants, exquisitely bound in vellum, by Mr. *Alex; Marshall.*"

It is interesting to note that the catalog of Tradescant's garden, occupying pages 73–178 of the book, and written one hundred years before the publication of Linnaeus's *Species Plantarum,* contains numerous binomial names. This is only another of the numerous instances showing that, while the method of binomial nomenclature was systematized and brought into general use by Linnaeus, it did not originate with him. As is well known, the binomial names of plants developed gradually by a progressive abbreviation of descriptive Latin phrases following the name of the genus. Illustrations of this, showing various degrees of abbreviation, are found in the *Musaeum.* Thus, for example, we find (p. 136) "*Lupinus caeruleus latifolius, medius angustifol: luteus*" (yellow lupine); "*Lupinus albus sativus*" (white garden lupine); and the straight binomial, *Lupinus Indicus* (Indian lupine); again (p. 117), *Geranium Indicum nocte odoratum* (sweet Indian cranesbill), and the binomial *Geranium Virginianum* (Virginian cranesbill), and so on throughout the catalog.

We are pleased to be able to reproduce herewith from this volume two portraits, and facsimiles of two pages.

The first portrait (fig. 6) is that of John Tradescant, the father, engraved from the miniature by Hollar. The original copper plate is said by Boulger to be still preserved in the Bodleian library, at Oxford University. In 1793 this portrait was copied by N. Smith and issued as a plate with Lysons's *Surrey,* with Ducarel's *Appendix to the History of Lambeth,* and with the third edition of Pennant's *London.* Thomas Allen's *History of Lambeth* (1827) contains an outline copy, and von Hamel's *Tradescant der ältere,* published in 1847 in Russia, contains a lithographic reproduction by Malenski.

In the Ashmolean Museum at Oxford there are three unsigned and undated portraits in oil of Tradescant the father; one a three quarter length medallion, ornamented with flowers, roots, and fruits; a second taken after death; and the third the miniature here reproduced from the *Musaeum,* by Wenceslaus Hollar. According to Boulger, there appears to be no foundation in fact for the inscription on all three of these portraits, and on one of the

son, in gilt letters over the varnish, ascribing them to "S^{r} John Tradescant."

The portrait of Tradescant the son, here reproduced as figure 7, is also from the original in the Ashmolean collection. According to the inscription underneath the legend, it was drawn from life and engraved by Hollar. As might be imagined, portraits of the son are more numerous than those of the father. In a *Letter to*

Iohannes Tradescantus Filius, genij ingenuiq;
paterni verus heres, relictum sibi rerum vndiq;
congestarum thesaurum, ipse plurimum adaucxit
et in Museo Lambethiano amicis visendum exhibet.
W. Hollar Bohemus delin. et sculp:

FIG. 7. John Tradescant, son. By Hollar. From *Musaeum Tradescantianum*. London, 1656.

William Watson upon the early cultivation of botany in England; and some particulars about John Tradescant, etc., published in 1773, in the Philosophical Transactions of the Royal Society, Ducarel gives a list of the portraits of the father and son, and of the latter's wife, in the Ashmolean Museum.

In the National Portrait Gallery, London, is an excellent likeness of the son by an unknown artist, showing a skull at his side. Of the three originals in the Ashmolean collection, one is attributed to William Dobson (1610–1645), and portrays the subject half length in his garden, with his hand resting on a spade; in a second he is shown in his "cabinet" at Lambeth, surrounded by beautifully wrought shells and with his friend the quaker brewer of Lambeth, bearing the fictitious name, Zythepsa. This is also attributed to Dobson. A third portrait of Tradescant in his fiftieth year, accompanied by his wife, in her forty-eight year, is dated 1656, and must, therefore, be by some other artist, unknown. Three other portraits in the same collection are all believed to be by Dobson.

In his *Historical and biographical sketches of the progress of botany in England,* etc., London, 1790, Pultney states that most of the known copies of the *Musaeum Tradescantianum* have been plundered of Hollar's portraits by collectors of prints. The volume in the Garden library is one of the few perfect copies.

The frontispiece of the book is an unsigned engraving of the escutcheon of Tradescant's arms, from the original, also in the Ashmolean collection, azure on a blend or, three fleurs-de-lys.

The facsimiles of the two pages (figs. 8 and 9) illustrate the curious custom, not uncommon in the seventeenth century, of endeavoring to wrest from the names of great men some laudatory and supposedly significant anagram, and of working this anagram into a complimentary stanza of verse. If the letters of the name would not yield a suitable anagram in Latin, English was tried, or *vice versa.* Thus, from the name of the father we have (fig. 8) "*Arte notus annis cedas. Natura, instans es: cedo*" (Renowned in art, thou declinest in years. Nature, thou endurest: I pass away), followed by a dialog in Latin between Nature and an Old Man (*Senex*), praising the virtues of the learned one. The anagram and stanza (fig. 9) based upon the same name, borne

by the son, are in English: "Cannot hide arts." All of this is very amusing from the present day point of view, and it is difficult to realize that it was all taken seriously two hundred and fifty years ago by men who were among the intellectual leaders of their time.

The history of the collection catalogued in the volume, and of the collectors, father and son, is both interesting and valuable

Anagr:

JOANNES TRADESCANTUS.

Arte notus, annis cedas.
Natura, instans es: cedo.

Natura.——Senex.
DIALOGUS.

Nat. *UTrique* NOTUS ARTE *jam satis polo;*
Utriusque deliciis satur;
Favore maximi beatus Principis;
Amore cultus omnium:
Quid quaeris ultra, terra quod donet, Senex.
Famam quod ornet insuper?
CEDAS, *molesti ne sient,* ANNIS *libens;*
Linquasq; linquentem domum.
Sen. NATURA, ES INSTANS: CEDO. *Nec ver-*
Stator supremi Numinis; (*ti potest*
Sed nec timeri debet, immensis beans
Brevem dolorem gaudiis.

FIG. 8. Anagram, in Latin, on the name John Tradescant (the father). *Fac simile* reproduction from the *Musaeum Tradescantianum.* London, 1656.

in its relation not only to botany, but also to the early development of natural history museums and of botanic gardens.

The year of the elder Tradescant's birth is not positively known. From the fact that his will was proved in 1638 (May 2), it is believed that he died in 1637, and certainly not later than the first half of 1638. He was a traveller, an extensive collector of all manner of natural history objects, and a gardener. In the *Paridisus Terrestris* (ed. 1629, p. 152), Parkinson describes him as "that painfull industrious searcher and louer of all nature's varieties."

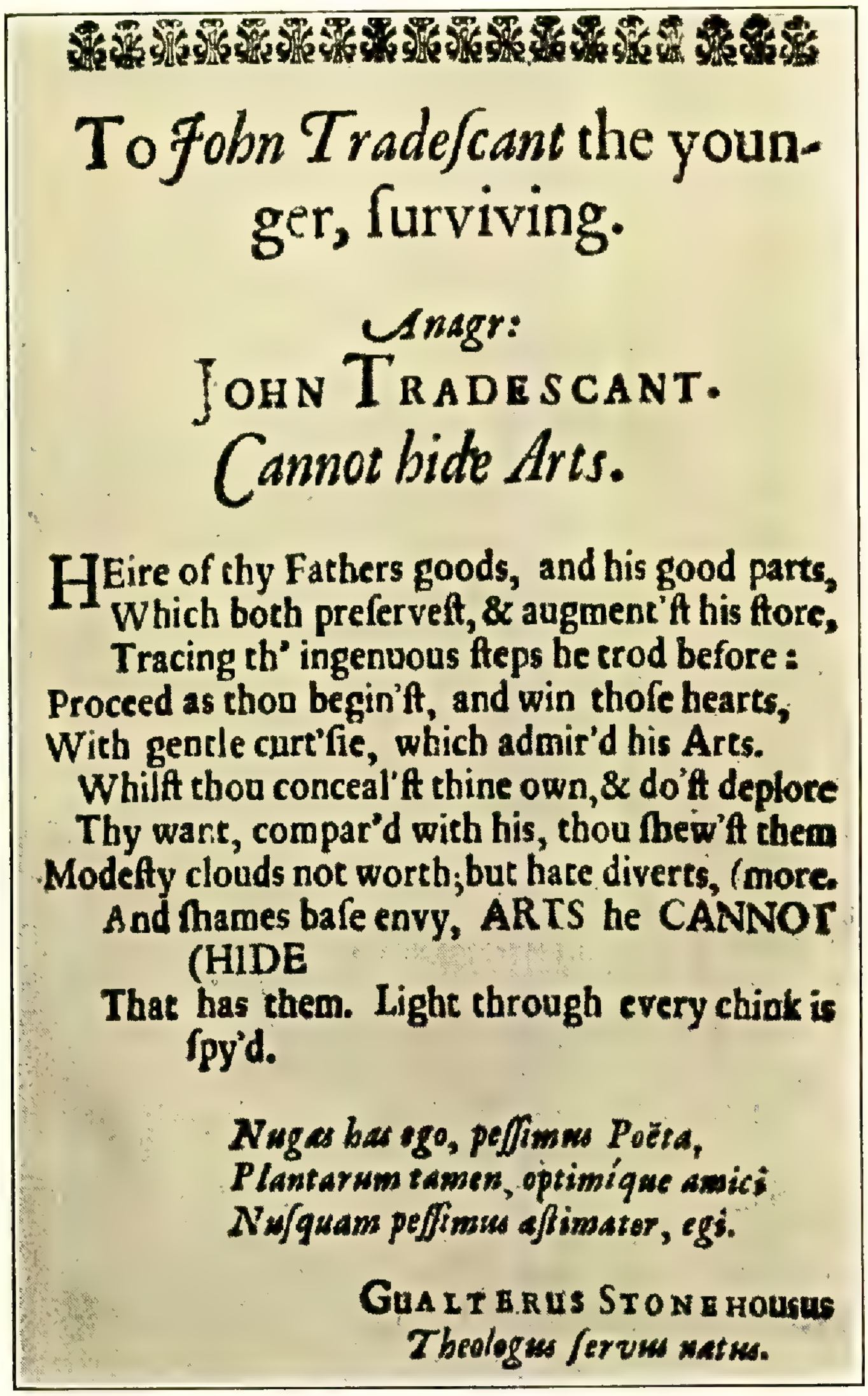
In 1625 he wrote to Edward Nicholas, in Virginia, that it was the pleasure of the Duke of Buckingham (George Villiers), in whose service he then was, for him "to deal with all merchants from all places, but especially from Virginia, Bermudas, Newfoundland, Guinea, Binney, the Amazon, and the East Indies, for all manner of rare beasts, fowls and birds, shells and stones." Thus was the opportunity given for enlarging his at that time wonderful collection of natural history objects.

The man's local reputation, and a fine sense of humor in his neighbors, are reflected in the name "Tradescant's Ark," which they applied to his dwelling, where the collections were housed. The building was torn down in 1881.

On the duke's death, Tradescant became gardener to the King and Queen, Charles I and Henrietta Maria, "the rose and lily queen," and this event is believed to have offered the opportunity for the beginning of his physic garden and the further development of the museum connected with it at South Lambeth. The garden was located nearly opposite "Spring Lane," on the east side of the South Lambeth road between Stockwell and Vauxhall.

Lysons (*Environs of London,* 1:330) credits this physic garden as "one of the first established in this kingdom." Pultney (*Sketches of the Progress of Botany,* 1:177) states that Tradescant was the first person in England to make "any considerable collection of the subjects of natural history." In 1749 the site of Tradescant's garden was visited by Sir William Watson, who gives an account of his visit in the Philosophical Transactions of the Royal Society (46:160), and there states that Tradescant's garden is, except that of Mr. John Gerard, the author of the 'Herbal,'

probably the first botanical garden in England." Watson gives a list of a few plants still surviving in 1749. While Gerard's garden may have antedated that of Tradescant, the statement of Singer (*Notes and Querries*, 5: 387. 1852) that "it was to the Tradescants we owe the foundation of the first Museum of Curiosities of Nature and Art" is doubtless correct. The collection



To *John Tradescant* the younger, surviving.

Anagr:
JOHN TRADESCANT.
Cannot hide Arts.

HEire of thy Fathers goods, and his good parts,
Which both preserveſt, & augment'ſt his ſtore,
Tracing th' ingenuous ſteps he trod before:
Proceed as thou begin'ſt, and win thoſe hearts,
With gentle curt'ſie, which admir'd his Arts.
Whilſt thou conceal'ſt thine own, & do'ſt deplore
Thy want, compar'd with his, thou ſhew'ſt them more.
Modeſty clouds not worth; but hate diverts,
And ſhames baſe envy, ARTS he CANNOT (HIDE
That has them. Light through every chink is ſpy'd.

Nugas has ego, peſſimus Poëta,
Plantarum tamen, optimíque amicî
Nuſquam peſſimus æſtimator, egi.

GUALTERUS STONEHOUSUS
Theologus ſervus natus.

FIG. 9. Anagram, in English, on the name John Tradescant (the son). *Fac simile* reproduction from the *Musaeum Tradescantianum*. London, 1656.

must therefore be regarded as the forerunner of our modern natural history and art museums.

The common spiderwort or "Wandering Jew" (*Tradescantia virginiana*) of our gardens, is named from the elder Tradescant, the name having been adopted by Linnaeus from the *Flora Jenensis* of Ruppins, published in 1718. The former name of the plant was *Ephemerum virginianum.*

John Tradescant, the son, author of the *Musaeum,* was born at Meopham, Kent, in 1608, and died in 1662. Like his father, he was a traveller, and succeeded his parent as gardener to the king and queen. In 1637, he visited that portion of America then known as Virginia, collecting plants, shells, and other specimens for the enrichment of the collection left to him by the will of his father.

He became an intimate friend of Elias Ashmole, whose collections, presented to Oxford University, became known as the Ashmolean Museum. Ashmole's dairy for 12 Dec., 1659 contains this entry:

"Mr. Tredescant and his wife told me they had been long considering upon whom to bestow their closet of curiosities when they died, and at last had resolved to give it unto me." This is followed by the entry under date 14 Dec.: "This Afternoon they gave their Scrivener Instructions to draw a Deed of Gift of the said Closet to me;" and, under the 16th, "5 Hor 30 Minutes past merid. Mr. Tredescant and His Wife sealed and delivered to me the Deed of Gift of all his Rarieties."

Tradescant's will, however, taking no cognizance of this "deed of gift," contains the following provision:

"Item, I give, devize and bequeath my closet of Rarieties to my dearly beloued wife Hester Tredescant during her natural life, and after her decease I giue and bequeath the same to the Universities of Oxford or Cambridge, to which of them shee shall think fitt at her decease."

Tradition states that after the deed of gift had been signed by both Tradescant and his wife at Tradescant's home, whither Ashmole had been invited to dine, and as he was departing with it, Mrs. Tredescant called him back and asked for the deed to make some slight change in it. Ashmole alleged that he never saw it again, and held that Mrs. Tredescant destroyed it.

However that may be, in 1664, two years after Tradescant's death, Ashmole preferred a bill in Chancery against Mrs. Tredescant* for (as stated in his diary) "the Rarieties her Husband had settled on me." The Lord Chancellor rendered a verdict in favor of Ashmole, adjudging him to "have and enjoy," the rarieties which are catalogued in the *Musaeum Tradescantianum,* except that Mrs. Tredescant was to hold them in trust during her life.

Ashmole built a large brick house closely adjoining Tradescant's, and his diary contains this entry for November 26, 1674: "Mrs. Tredescant being willing to deliver up the rarieties to me, I carried several of them to my house." The remainder were transferred a few days later. It is interesting to note that, from a statement in the *Compleat Angler* (1: 62. London, 1836) Isaac Walton probably visited them at this time.

In 1677 Ashmole offered to present the entire collection to Oxford University on condition that the university would provide a suitable building for it. The condition was met, the building being designed by Sir Christopher Wren, and the collection was installed there in 1683, being known from that day to this as the Ashmolean museum. Thus, as Pultney says (Sketches, 1: 179), "the name of Tradescant was unjustly sunk in that of Ashmole."

While Tradescant's collection appears to have been the first of its kind, assembled by a private individual, the Ashmolean museum was not the first public museum, for Sir William Henry Flower (Essays on Museums, London, 1898) is authority for the statement that the earliest known museum formed by a society of individuals was that of the Royal Society in Crane Court, of which an illustrated catalog was published by Dr. Grew in 1681.

It has been asserted that the *Musaeum Tradescantianum* was printed before 1664, the date of its publication. The basis of this assertion is the following statement in the preface: "About three years agoe, (by the perswasion of some *friends*) I was resolved to take a *Catalogue* of those *Rarities* and *Curiosities* which my *Father* had scedulously *collected,* and my *self* with continued diligence have *augmented,* & hitherto *preserved* together."

It seems clear, however, that this statment refers only to the time when the author began the preparation of his manuscript,

* The name has a variant spelling.

and there is no good evidence that the publication of the book was delayed after it left the press.

C. S. G.

BACK YARD GARDENING IN TOLEDO, O., AND LEBANON, PA.

The Toledo Museum of Art "is conducting an active campaign that will lead to a more wholesome and attractive city. One branch of the work will be the beautifying of the home grounds, and for that purpose the museum has engaged an expert gardener who will be pleased to furnish anyone with free advice on flower and shrub planting."

The above quotation is from an article on "Landscape gardening—its relation to the back yard," in the April, 1914, number of the *Museum News*, published by the Toledo Museum of Art.

Gardening would not, at first thought, be considered as an activity in which an art museum would be deeply interested. But art museums might very properly be expected to be greatly interested in the beauty of the cities where they are located, and it is from this point of view, as a means to a "city beautiful," that the Toledo museum has become interested in gardening.

A letter to the writer from Mr. George W. Stevens, director of the Toledo museum, contains the following information about this phase of their work:

"We have the services of an expert landscape gardener, Mr. W. H. Steffens, who goes to the schools for daily talks. Some of the older children come to the museum for these talks, which are illustrated with colored slides. Last month 8,000 children came to the museum talks. The street car companies carried them free—running special cars, which was most generous. We give 250 cash prizes, $1,000 in all, for the best house garden, the best back yard, the best vacant lot, best school garden, etc. A certain number of prizes are allotted to each school district. There are general prizes as well. We help the factories beautify, sending our expert to lay out schemes, and concern ourselves in such other ways as from day to day are suggested.

"Seeds are sold at cost, one cent a package, at the schools, at

the newspaper offices, and at the museum. About 300,000 packages have been sold to date.

"Later in the season we will have a flower show at the museum, at which time judges will award the various prizes."

In connection with its "city beautiful" campaign, the museum has issued a four page illustrated leaflet on "The making and care of home gardens, containing full directions for preparing the seed and planting in back yards, along sheds, fences, and porches, along paths, and in window boxes."

The People's Saving Association, of Toledo, being primarily interested in encouraging thrift and home owning, has donated the sum of $900, to be distributed as cash prizes for the most creditable results under the following nine heads: vacant lot gardens, home flower gardens, home vegetable gardens, home flower and vegetable gardens, home gardens of ward and parochial school children, individual varieties of flowers, individual varieties of vegetables, best collection of five bunches of flowers of any variety whatever, and the best collection of five varieties of vegetables of any varieties whatever. The prizes are of three grades, first, second, and third, and range in value from $25 for the first prize under each of the first four classes, to $1 for the third prize under the sixth and seventh classes.

In connection with this work the People's Saving Association has issued an attractive Garden Book, illustrated in color, and giving information about the vacant lot and home garden movement.

This admirable campaign in the Toledo museum is only one of the illustrations, happily becoming increasingly common in this country, that museums and botanic gardens, especially when supported in whole or in part at public expense, are justified only by the service which they render, not merely to professional and amateur artists and scientists, but to the entire community. It is in recognition of this fact that the Brooklyn Botanic Garden has adopted the phrase, "For the advancement of botany and the service of the city," as best expressing the nature and range of its activities and interests.

Lebanon, Pa., furnishes an example of what may be done in smaller cities. The population of Lebanon is only about 20,000.

The following account of the work there is taken from *School Science and Mathematics,* for December, 1913.

"Under the direction of Mr. F. W. Robbins, superintendent of schools of Lebanon, Pa., a movement is on foot to transform the vacant lots in and about that city into flourishing gardens during the summer months through the aid of school boys. Suitable lots throughout the city will be selected. A competent supervisor will be appointed to have charge of the work, and the parents of the boys will be requested to cooperate with the board in having the children attend regularly to their gardening as directed by the supervisor. Before the children can be enrolled it is required that they secure the consent of their parents. One hundred and eighty-nine boys between the ages of eight and fourteen years have expressed a desire to become gardeners during the summer."

C. S. G.

FIRST ANNUAL HIGH SCHOOL DAY

On May 23 the members of the New York Association of Biology Teachers, and their friends, were invited to meet at the Garden for a conference and an inspection of the collections and other facilities available at the Garden for teachers in local schools. The following was the program for the afternoon:

2–3. Conference.
- What the Garden can Offer the Schools.
  - The Director of the Garden.
  - The Curator of the Public Instruction.
  - The Instructor.
- High School Classes at the Garden.
  - The Teachers of Classes that have used the Garden.
- Suggestions from Teachers.
  - Open Discussion—led by the President of the New York Association of Biology Teachers.

3–4. Inspection of Buildings.
- The Laboratory Building.
  - Library.
  - Herbarium.
  - Lantern Slide Collection.
- The Conservatories.

4–5 : 30. Inspection of Plantations.
Children's Gardens.
Systematic Section.
Morphological Section.
Ecological Section and Swamp.
Native Wild Flower Garden and Bog.
The Lake.

In the open discussion during the conference the Garden received many welcome suggestions as to how it may become of greatest usefulness to local schools in connection with their botanical instruction. It is hoped that this meeting will prove to be the first of an annual series of similar gatherings at the Garden.

C. S. G.

OPENING OF THE TROPICAL ECONOMIC HOUSE

The inspection of the Garden buildings on May 23, 1914, by the members of the New York Association of Biology Teachers, and their friends, included the second (central) section of the conservatories, which was opened to visitors for the first time on that occasion. This house measures 104 feet in length, 44 feet in width, and has a maximum height at the lantern of 36 feet above mean ground level. Plans for its interior treatment, were prepared by the Pierson U-Bar Co., and approved by the Committee on Botanic Garden of the trustees at its meeting of December 26, 1913.

These plans included a circular water basin near the east end of the house, 18 feet in diameter (outside dimensions) and 3 feet deep. The overflow from the basin is carried to the outlet near the west end of the house by a small meandering stream, flowing in a valley, and interupted by three diminutive waterfalls. To one standing near the outlet of the stream the water basin is concealed by a boulder bridge seven feet high above the surface of the stream.

The overflow of water from the basin finds its way to the stream from between the boulders in the wall of the bridge. In the crevices between the boulders are planted *Ficus repens, Helxine Soleirolii,* various ferns, and other plants, while vines of *Sechium edule* and *Monstera deliciosa* are becoming established

for climbing over the east wall. Two small "fields" of rice are thriving, one on either side of the stream near its outlet. The borders of the paths are planted with *Cyrtomium falcatum,* a hardy decorative fern.

The plants in this house, except those used for purely decorative purposes, are to be confined to tropical economic species, and already comprise numerous, though not large, specimens of considerable popular interest, including the new *tangelo,* a cross between the tangerine and the grapefruit (*pomelo*). This interesting citrus novelty, together with most of the other plants now installed, were obtained by the director of the Garden during a recent trip to Florida. The tangelo has not yet made its appearance in northern markets but may be looked for in the near future. The fruit is intermediate in size between the tangerine and the grapefruit, having the flavor of the latter, but in a milder degree, and separating easily, after the manner of its other ancestor, the tangerine.

If treated according to most precedents, this house would be developed like the familiar "palm house," but that treatment is more apt to be met with elsewhere, outside of a botanic garden. For this reason, and more especially because it is believed that a collection of tropical economic plants will be of much greater educational value, and of quite as much, if not more, popular interest, it was decided to depart from the more usual treatment. There are, of course, cultural difficulties to be met with in making this plan a success, but it is believed that these difficulties can be largely overcome.

C. S. G.

INAUGURATION OF CHILDREN'S GARDENS

On May second was started the outdoor work for children at the Garden. One hundred and eighty children applied for gardens and one hunred and fifty received them, leaving a waiting list of thirty names. Seventeen schools were represented by these children. These schools are Nos. 39, 92, 42, 139, 66, 12, 9, 111, 83, 3, 45, St. Theresea's, Holy Cross, Girl's High, Commercial High, Adelphi Academy, and Erasmus Hall High School.

The gardens are in two sections. One, a garden of ninety beds, was laid out and is supervised by the young women in the course for the preparation of school-garden teachers. This is one of the courses offered for the first time last fall by the Botanic Garden. The other is made up of sixty gardens. This garden was laid off and is supervised by the senior kindergarten class from Pratt Institute.

The individual garden beds, 5×7 ft. in size, are planted to vegetables, including beans, kohlrabi, onion seed, onion sets, carrots, beets, radishes, and lettuce. Flower beds were planted by the children about the boundaries of these sections. Then there are some larger sections planted to grains, peanuts, melon, corn, and other things unsuited to planting in small areas. These again are study spots, where the children learn about the growth and culture of other plants than the very few which it is possible to raise in small individual garden beds. Another area is to be planted with plant families, a few of the more common families having been chosen for study.

The young women in the normal class have their own gardens, larger in size than those of the children, and some of the older boys have sections in which they are carrying on experimental work.

Back Yard Gardens.—During March the principals of the public schools of Brooklyn were notified that the Botanic Garden would supply penny packets of seeds to pupils who applied through their principals. Large manilla envelopes were prepared, with a list of seeds available printed on one side, and gardening directions on the other. Seeds were offered of eight different kinds of vegetables and ten different flowering plants. On the smaller seed envelopes were printed brief directions for planting. One thousand envelopes were prepared, with the anticipation that that would be ample for this season. Our surprise and dismay may well be imagined when it was found that requests were received for over 26,000 penny packets. Over twenty-five thousand packets were supplied by the Garden direct, and the remainder, a very late order, indirectly through a local seed house. There was an average of about five packets per child, so that over five thousand Brooklyn children are planting their own gardens this spring, either at home or at their school. A school garden exhibit is being

planned for September 24–26, at which pupils will be invited to exhibit the products raised in their gardens, and prizes will be awarded to individual children and to schools for the best exhibits. Fuller information will be found in the Garden *Leaflet,* No. 6, for June 3, 1914.

GARDEN CLUBS IN BROOKLYN PUBLIC SCHOOLS

On April 30, fifty delegates, pupils from the seventh and eighth grades of Public School No. 3, met at the Botanic Garden to discuss ways of promoting garden interest in their school. These delegates were given a lesson, by the instructor of the Garden staff, on laying out a small garden. This lesson was repeated by the delegates to successive groups of other pupils in all grades of the school.

On Arbor Day the instructor from the Botanic Garden met the delegates again, at Public School No. 3, for a planting lesson. This lesson also was repeated to the whole school by the same group method. Students of the history of education will recognize in this procedure the old Lancastrian method of teaching—a method that never became permanently established. The delegates have formed themselves into a Garden Club and, among other things, are taking charge of providing their school with penny packets of seeds. All detail work is left to the club. During the past spring 2,500 penny packets of seeds have been supplied to this one school through the activities of its own Garden Club.

Public School No. 66 held its annual exhibit on May 14, when the Garden Club of the school made its first exhibit. This Club is made up of twenty-five girls from the fifth and sixth grades. The girls have met for ten consecutive Wednesday afternoons in the children's greenhouse at the Botanic Garden for lessons in plant propagation. This is an afternoon class with a membership purely voluntary, and the exhibit was entirely the work of these children. Vegetable seedlings, flowering nasturtiums, marigolds, sweet-peas, young canna, begonia, and gladioli were arranged on one large table. Over this were two charts, one showing the written work of the class, directions for planting, et cetera; the other, a blueprint of seedlings in different stages of development. E. E. S.

CHANGES IN THE GARDEN STAFF

Head Gardener: On January 22, 1914, Mr. John V. Borin, head gardener since March 15, 1911, presented his resignation to take effect not later than March 1, 1914. The resignation was accepted to take effect on the date named.

On February 25, the appointment as head gardener was accepted by Mr. Montague Free, to take effect on March 16, 1914. For the seven years from April, 1899, to March, 1906, Mr. Free was at the University Botanic Garden, Cambridge, England, where he gained practical experience in all departments of that garden, and studied botany in the Cambridge Technical School. From March, 1906, to May, 1908, he was propagator in the outdoor department of Marley Place Gardens, Essex. The collection of hardy plants at Marley Place is one of the largest, if not the largest, of any private place in England.

From May, 1908, to March, 1912, Mr. Free was a member of the gardening staff at the Royal Botanic Gardens, Kew, England, serving first as gardener in the tropical and herbaceous departments, and then for three years as sub-foreman in the Alpine department. During this period he was for a time secretary of the Kew British Botany Club, and received from Kew certificates in the following subjects: physics and chemistry, systematic botany, economic botany, geographic botany, and plant pathology. He also obtained the certificate of the Royal Horticultural Society in the Public Parks examination.

Mr. Free came to the United States in March, 1912, and was assistant gardener at the New York State College of Agriculture, at Cornell University, until February, 1913, when he became instructor in floriculture and superintendent of the greenhouses and garden at the School of Horticulture for Women, Ambler, Pa. From October, 1913, until his present appointment, he was engaged in commercial work and landscape gardening in New York City.

Librarian: During the forepart of April, the librarian, Miss Helen Virginia Stelle, was obliged to leave for her home in Upper Alton, Illinois, on account of illness, and later presented her resignation, to take effect on April 21. On May 20, Miss Anna

K. Fossler, supervisor of the serial department of the library of Columbia University, was appointed acting librarian for the month of June.

Laboratory Assistant: Mr. Guy Bisby, laboratory assistant, has been granted leave of absence from April 4 to October 15, in order to undertake important investigations on the potato scab, a disease of great economic importance, imported into this country from Europe, and threatening to become very disastrous to our home crop.

Herbarium Assistant: On April first, Dr. Alfred L. Gundersen was appointed temporary assistant in the herbarium. Dr. Gundersen received the degree of Docteur de l'Universite de Paris (sciences naturelles) in 1910.

NOTES

On account of grading operations and the construction of new paths throughout the Garden, it has been necessary to close all gates except the one at the entrance to the laboratory building and conservatories, on Washington Ave., opposite Montgomery St. Adults, classes with teachers, and children accompanied by adults may enter the grounds at regular hours by applying at the laboratory building. The conservatories remain open as usual.

The University of Cincinatti, Department of Biology, has issued a circular under date of March 6, 1914, announcing the creation of a position as supervisor of school gardens. The circular states that the university cooperates with the school garden work in the public schools of the city. "A course in school gardening is given by a member of the botanical staff of teachers in the city schools and to students in the college for teachers. This man also acts as manager of the school gardens of the city during the summer months." The circular calls attention to the fact that, "There in no line of applied botany which offers greater opportunities for a man to make a reputation in creative work than the field of municipal home and school gardening." The supervisor to be appointed will rank as instructor in the University, and the maxi-

mum salary to be paid is $3,000. The position became open about the middle of June, 1914.

On May 15 were held the opening exercises of the new forestry building of New York State College of Agriculture, at Cornell University, Ithaca, N. Y. An elaborate program was carried out, occupying the entire day and evening. On the day following, the Society of American Foresters held in the new building an open meeting devoted to a discussion of the topic, "Lines of principal effort in American foresty for the next decade."

The May, 1914, number of *Art and Progress* was a special garden number, with articles on old world gardens, New England gardens, formal gardens, garden sculpture, gardens of California, Charleston gardens, and an editorial on outdoor art and the modernists movement.

On May 6, a class of forty pupils from the Commercial High School (Annex), accompanied by their instructors in botany, Dr. Micael Levin, and Dr. Wallace A. Manheimer, visited the garden under the guidance of a member of staff.

Visitors to the Garden since January 1, 1914, included Dr. Edmund W. Sinnott, of the Bussey Institution of Harvard University, Dr. W. A. Orton, of the U. S. Department of Agriculture, Washington, Dr. Jean Broadhurst, of Columbia University, and a class of young ladies, Prof. E. M. East, of the Bussey Institution of Harvard University, Prof. Manahu Miyoshi, of the botanic garden of the Imperial University, Tokyo, Dr. Harry B. Shaw, of the U. S. Department of Agriculture, Prof. Chas. W. Hargitt, of Syracuse University, Dr. Charles Brooks, U. S. Department of Agriculture, Prof. John W. Harshberger, University of Pennsylvania, Prof. Fred. D. Fromme, of Purdue University, and Professor R. A. Harper, of Columbia University.

On May 16, Dr. H. A. Gleason, assistant professor of botany in the University of Michigan, visited the Garden. Dr. Gleason was passing through New York *en route* for Ann Arbor, after a year's trip westward around the world. During the trip he visited the principal botanic gardens of the countries passed through, including those at Tokyo, Buitenzorg, Paradeniya, Paris, and Kew.

Beginning with volume XVIII the business management of the *Journal of Biological Chemistry* will be conducted for the directors of the *Journal* by the publication department of the Rockefeller Institute for Medical Research.

The Garden library has received volume I, number 1, of the new *Annals of the Missouri Botanical Garden,* issued in March, 1914, and comprising 155 pages. This is a quarterly publication containing scientific contributions from the Missouri Botanical Garden, and from the Graduate Laboratory and Faculty of the Henry Shaw School of Botany of Washington University, which is affiliated with the Missouri Botanical Garden. The Introduction to the first number states that "The Annals will be maintained upon a strict subscription basis, using it in exchange only when its equivalent can be obtained." This publication and the *Bulletin* of the garden together take the place of the Annual Report, familiar to botanists since 1890. The *Twenty-third Annual Report* (1912) marks the close of that series.

At the meeting of the Council of the American Association for the Advancement of Science, on April 21, 1914, the first of the Jane M. Smith life memberships in the association was awarded to Professor Charles Horton Peck, Albany, N. Y. for thirty-seven years state botanist of New York.

On March 4 the director of the Garden addressed the National Arts Club at their club house, on the subject of The Botanic Garden Idea for American Cities; and on April 30, the National Plant, Flower, and Fruit Guild, at their annual meeting in the American Museum of Natural History, on the Brooklyn Botanic Garden.

Science, for April 3, 1914, contains the following item: "The House Committee has favorably reported the bill providing that the historic botanic garden [in Washington, D. C.], located for many years at the foot of Capitol Hill, be removed to Rock Creek Park, in the far northwest section of the city. The bill also provides that the garden is to pass from the direct control of congress to that of the department of agriculture."

The contract for the construction of new walks, and allied work in the Garden, was awarded during April to the lowest bidders, Messrs. Di Menna & De Paola, 2336 Cambrelling Ave., Bronx, New York City. The contractors were notified to begin work on this contract on or before May 4, 1914, and the specifications call for the completion of the work in ninety working days. The work actually began on Wednesday, May 6.

On May 21, bids were opened for the completion of the grading between Mt. Prospect reservoir and the Central Museum grounds, and on the area of esplanade. Norton & Gorman were the lowest of five bidders, with a total bid of $9,979.20. The contract was awarded to this firm on May 21, and the contractors were instructed to begin work on or before June 25. The work began on June 23, and the time allowed for its completion is 45 consecutive working days.

On January 21, Dr. Olive gave a lecture on "Forestry," in the auditorium of the Central Museum, before about 500 pupils of the Girls High School, Brooklyn.

On Friday, February 13, the botany class of Erasmus Hall High School, accompanied by Dr. C. A. King, head of the department of biology of the school, made their first visit to the Garden, in order to take advantage of our greenhouse facilities in their study of the germination of seeds.

On the afteroon of May 26, two local organizations, the Chiropean Woman's Club, of Flatbush, and the Kezhikone Camp Fire Girls, of the Y. W. C. A., visited the conservatories and plantations, with a Garden guide. Miss Van Nostrand, Y. W. C. A. Secretary for Girl's Work, accompanied the Camp Fire girls.

At the annual meeting of the Nassau County Teacher's Association, held at the Mineola (L. I.) High School, on Friday, May 15, 1914, Miss Shaw addressed the intermediate section at 10 a. m., and the primary section at 11 a. m., on the subject "School gardens and gardening." On Thursday morning, May 28, Miss Shaw addressed the elementary department of the Montclair Academy on the general subject of nature study, with special reference to observations during the summer vacation.

The following item appeared in *Science* for May 1, 1914: "A series of water-color plant studies painted by the late traveller and artist, Miss Adelia Gates, and presented to the Smithsonian Institute by her niece, Miss Eleanor Lewis, of Yellow Springs, Ohio, is now exhibited in the new building of the U. S. National Museum. The subjects treated embrace a wide range of foreign and domestic plants painted by the artist in this country and abroad. Some additions have recently been made to the original deposit by the donor who has endeavored to bring together all the flower studies made by Miss Gates, many of which were widely distributed prior to her death. With these additions, the collection now numbers some 600 paintings.

A circular letter of May 8, 1914, from the president of the Torrey Botanical Club, addressed to members of the club, contains the following two paragraphs which will be of interest to all persons interested in the local flora:

"The Club proposes to undertake special work during the coming year on the cryptogramic flora of the region. The completion and provision for publication of Mr. Taylor's list of the flowering plants suggest the extension of the Club's activities to this further field as the next large undertaking necessary to complete our knowledge of the plant life of the local flora district.

"Notable work on various groups of the cryptograms has already been accomplished and it is hoped to publish at once in the club's journals preliminary lists, so far as they are available. It is the desire of the Club to enlist the assistance in this undertaking of as many collectors and field workers as possible. It has been decided to create a considerable number of special committees with chairmen, who, as far as possible, are interested in particular groups and to invite the members of the Club and others to enroll themselves on one or more of these committees. The chairmen will organize field excursions either for their special work or in conjunction with other committees and the effort will be made to arrange the dates for the trips to the different regions so as to visit each locality at a time most favorable for collecting its special flora. It is desired that the data obtained should include records as to abundance, perfection of development, etc., at the various

stations for each species and that such records be continued in succeeding years so that in the case of the fleshy fungi and algae especially more reliable information as to their occurrence and distribution than is now available may be accumulated."

Science for April 24, 1914, contains the following news item: "The seventieth birthday, on March 25, of Professor Adolf Engler, the director of the Royal Botanic Garden and Museum at Dahlem, near Berlin, was celebrated in the presence of many eminent German and foreign botanists, by several functions. According to the account in *Nature,* on the day itself, Professor Pax, rector of the University of Breslau, with Professors Diels and Gilg, as its editors, presented to Professor Engler a copy of the *Fest-Band* of Engler's "Botanische Jahrbücher." The volume forms a supplement to the fiftieth volume of this publication, and consists of more than forty illustrated contributions, largely from his pupils. Professor Haberlandt presented Professor Engler, on behalf of hundreds of subscribers, with his life-size marble bust, the work of the sculptor, A. Manthe. On March 26 there was a banquet at which the official world was represented, and on March 27 the monthly meeting of the Deutsche Botanische Gesellschaft was converted into an "Engler" meeting, and Professor von Wettstein gave, by special invitation, a lecture on the phylogenetic evolution of the Angiosperm flower. It will be recalled that Professor Engler planted a tulip tree in the native wild flower section of the Garden on October 16, 1913.

Professor Philippe Edouard Leon Van Tieghem, Member of the Institute, for many years professor of botany at the Museum d'Histoire Naturelle, Paris, and eminent for his contributions to plant anatomy, plant physiology, and systematic botany, died in Paris on April 28, at the age of seventy-five years.

Prof. H. M. Hall, of the University of California, department of botany, visited the Garden on June 16. In the RECORD for January, 1913, attention was called to the plans, now being developed, for a new botanic garden at the University.

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PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.

2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.

3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

7. *Studies of Teratological Phenomena in their Relation to Evolution and the Problems of Heredity. 1. A Study of Certain Floral Abnormalities in Nicotiana, etc.* 14 pages, figs. 4. 1914.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Current numbers free to all who wish them. Back series complete, 50 cts. each; back numbers, 5 cts. each.

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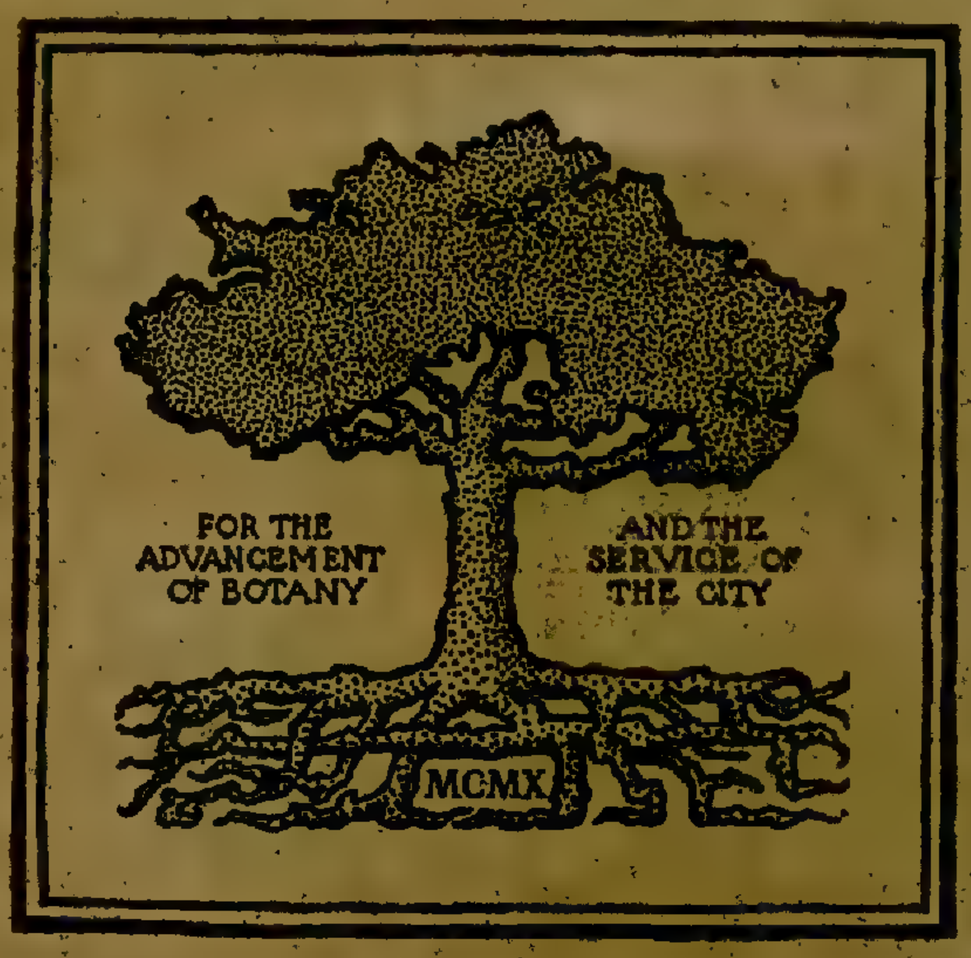
BROOKLYN BOTANIC GARDEN

RECORD

VOL. III OCTOBER, 1914 No. 4

EDITED BY

C. STUART GAGER



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BOTANIC GARDEN STAFF

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MR. NORMAN TAYLOR, *Curator of Plants*

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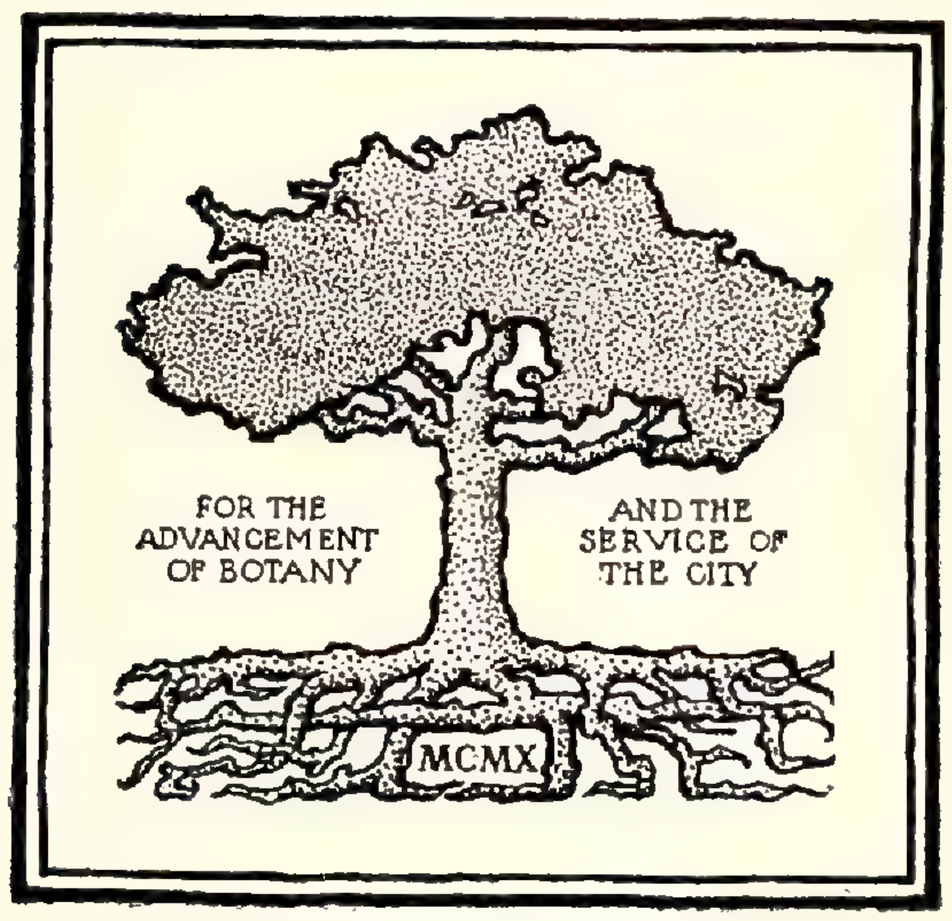

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ERRATA

Page 27, line 5, for "second" read "third."

Page 74, line 25, for "August" read "July;" for "September" read "August."

Franklin W. Hooper.

FIG. 10. After the miniature from life by Maud H. Purdy. Photo by Louis Buhle.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. III October, 1914 No. 4

THE CHILDREN'S WORK

In harmony with the aim to make the Brooklyn Botanic Garden of the utmost value and service to the general public, definite plans were early made to interest one body of citizens, the children. It appears, on the very face of it, plausible and practical that, if children are trained in the knowledge of a subject or an institution, a foundation is laid for the future. But to take a highly specialized and scientific institution, like a botanic garden, and make it a place of real interest and pleasure to children, not only without interfering with its scientific work and standing, but thereby adding strength to the institution as a whole, required definite, well considered plans. Whatever work was to be done, if it was to be of permanent value, could not be casual and haphazard. The first thing to consider was this: how to make the Botanic Garden a center of botanical interest, an interest which should lead to and not away from the Garden. Now the elements to link to the Garden are the home and the school. For through these two agencies are children reached. And to be of service to the children, the schools must understand all that the Botanic Garden had to offer, how it could help, where it might cooperate. Again, whatever interest was awakened must strike back home if the greatest service was rendered.

Our initial work was small indeed, but based upon lines which will continue. Invitations were sent to four neighborhood public schools, stating that certain classes in plant culture were to be started in the greenhouse, beginning in December and January,

and lasting for ten consecutive weeks. It was requested that children ranking well in their general school work, and especially in their nature study, be sent as delegates. It was hoped that these children might be held responsible by their schools for making short reports of their work to their grades, or in assemblies. The four schools involved in this work were P. S. Nos. 9, 93, 111, and 167.

Three classes were formed: a Saturday morning class for boys from 9 to 10, January 10 to March 14; one at 10:30 for girls from January 3 to April 4; and another for boys of the graduating year, from 2 to 3:30 in the afternoon, from March 7 to May 9.

The morning classes took up different ways of propagating plants; i. e., from seeds, cuttings, bulbs and roots. They learned to mix soils and to understand in a limited way the needs of plants. The results of their labors belonged to the children, and as plants became strong and mature they were carried home, or to school, or kept in the greenhouse for the outdoor garden. For these children started seedlings of flowers and vegetables such as lobelia, aster, salvia, hollyhock, pansy, lettuce, tomato, and onions. Whenever there was a birthday among the families at home, plants raised by the children for this purpose were sent to the one celebrating. An unusual number of birthdays fell in the spring months this year. If no absence occurred, or if an abscence was made up for, the children received certificates. Ten certificates were granted to boys, and eleven to girls.

The class of older boys worked along experimental lines in botany, a course acting as preparation for better understanding of high school botany. Seven boys completed this course.

In these classes were members who were entered either at their mothers' request or their own, filling in the places left vacant for some good and sufficient reason. Membership in these classes represented an honor and privilege. Many requests have been made to join the fall classes. We could fill our children's greenhouse every afternoon after school, and all day Saturday, if it were possible for us to handle the instruction, and if we had another house for the children's plants. Last spring our greenhouse was full to overflowing with the work of these classes and the adult classes.

Twenty-five girls from the fifth and sixth grades of P. S. 66 started work in the greenhouse, March 11. Nineteen of these girls received certificates. To gain a certificate ten lessons must be covered, the attendance must be perfect as well as the behavior. These children came, rain or shine, and it rained very often. Miss Howe, one of the kindergarten teachers from P. S. 66, came with the girls. No more satisfactory work was done this year than that done by this class. In June at the regular school exhibit, their garden products took a prominent place. It might be well to add that this class was held after school hours and that the children had two car lines to use on their way to the Garden.

An outgrowth from this class was one of the prize home gardens, planted and cared for by three members of the class. These girls borrowed a backyard, and had a garden in spite of the fact that not one of them owned a back yard.

During April and May a series of lantern slide talks was given, to introduce the Botanic Garden to children in still another way. These talks, "Stories about useful plants," were on various subjects pertaining to economic plants, as follows:

April 18. Rope and how it is made (manila and sisal fibers).
April 25. The story of bread (wheat).
May 2. Beverage plants (cocoa and chocolate).
May 9. A plant serving a useful purpose (rubber).
May 16. The food of a billion people (rice).

Certain firms cooperated with the Garden by sending illustrative material for the talks, pictures from which lantern slides could be made, and even sets of slides. These firms were the Shredded Wheat Company, International Harvester Company, Waterman Pen Company, Seeman Brothers (wholesale grocers), Huyler's, and the Walter S. Baker Chocolate Co. These firms have our heartiest thanks for making it possible adequately to illustrate these talks.

When the talks were planned the question arose of how to touch as many children as possible. These little lectures were to be given on Saturdays, a day when the schools have no jurisdiction over the children. Our lecture room holds but fifty, with any degree of comfort, when the lantern is used. So the following

plan was adopted. Five tickets were sent to each of ten different schools, with the request that they be given to children who would use them. Tickets were sent to a different set of schools for each talk. Those who came reported to their respective schools on the subject taken up that special Saturday. Boys from one of the older classes operated the lantern. This class, drawn from P. S. 9 and P. S. 168, with a number from the preparatory department of the Polytechnic Institute, stands ready always to assist in the work for the younger boys and girls.

The outdoor work in the Botanic Garden is an outgrowth from the indoor greenhouse classes, and a part of the teachers' course in the preparation of school garden teachers. One of the separate courses for teachers is a summer's experience with children in a garden, and so our children's garden this year has represented a training ground for these young women.

The children's garden, as before stated in the RECORD (January, 1914), was divided into two parts, one an area 75 ft. x 50 ft., with thirty plots, each approximately 7¼ ft. x 5 ft.; the other, 84 ft. x 26 ft., with 60 plots, each 4 x 6 ft. This division into two separate gardens is by no means ideal, but the present site of the children's garden is temporary. The division was made because the senior kindergarten students from Pratt Institute took a course in gardening at the Botanic Garden, and needed a portion of the available space for their practice garden.

Sixty children, two to each plot, were allotted places in this practice garden. Through the center of each plot was planted a row of bush beans, and in each half there were beets, onion sets, carrots, lettuce and radish. This garden was managed and the lessons given, until June 15, by the Pratt students. At that time the children had taken out of their plots radishes, lettuce, young carrots, thinnings of beets, and string beans. About the garden, groups of children planted broom-corn, sunflowers, and three ornamental flower beds from seedlings started by the Pratt seniors in the greenhouse prior to their outdoor work. So the children received lessons in laying out a garden, planting, transplanting, cultivation, second crops, and ornamental flower beds.

At the time the seniors left, a number of children left for their vacations, and so the number of pupils in the garden was reduced

from sixty to forty-one. But the general scheme was continued, since in most cases only one partner withdrew, and the partner left behind took over the entire plot. The management of this garden, then, would naturally have fallen into the hands of the regular students. But two Pratt seniors desired further practice, so they took into their hands half of the periods when this garden was open to the children. The garden was open all day on Tuesdays and all day on Fridays, making four sessions in all.

As the season advanced, a second crop was planted, and the garden was mulched to protect it from the midsummer heat. Lessons were given in the garden on such subjects as succession crops, insect pests, transplanting, thinning, hill planting, mulching, picking of flowers, special crops (as grains), and staking of plants.

This same type of work was carried on in the other gardens. Here the children fell into two groups, the older children, in the rear and side of the garden, having larger plots, and the younger children having the smaller plots. The older children planted the observation beds of cotton, flax, hemp, tobacco, corn, millet, buckwheat, peanuts, and certain vegetables, which, for lack of space, could not be planted in the individual plots. Among these vegetables were squash, cabbage, tomato, chicory, cucumber, melons, parsley, celery, okra, and sweet potato. The care of these beds fell upon the older boys and girls, while the flower borders were under the care of the younger children.

The total amount of the various crops from both gardens was as follows:

Beets	3,791	Radishes	12,051
Carrots	5,968	Onions	1,156
Kohlrabi	1,066	Tomatoes	188
Corn	142 ears	Lettuce	1,036 heads
Beans	106 quarts	Swiss chard ...	123 quarts

Various experiments have been carried on in addition to the regular work. One lad has planted an area to beans treated with "farmogerm," a soil preparation for leguminous crops; several boys have a definite piece of work in inheritance with castor oil beans, started with beans of known hereditary characteristics. This same experiment is being carried on by one member of this

FIG. 11. Trophy, awarded to the school having the best exhibit at the annual Children's Garden Exhibits of the Brooklyn Botanic Garden.

class at his summer home on Long Island, and by some members of the Montclair (N. J.) Academy.

The method of instruction in our gardens is not a group method, except in the first lessons, or when the gardens are planted. After that the instruction is individual. Each child advances as fast as his ability and the condition of his crop permits. The older children assist in teaching new ones or those backward in work.

On the first of August, when the regular garden was running easily, classes were started in nature subjects which were related to gardens. These classes were taught by the young women in training. The subjects taken up included work on trees, wild-flowers, weeds, the mounting of botanical specimens, birds, and first aid in case of simple accidents which might occur in the garden. The older boys made a study of economic plants. After their study they were assigned a special topic, such as cotton, how linen is made from a flax plant, rice as food, etc. Then the boys gave talks on their special subjects to the younger children. The stereopticon was at their disposal, and whatever illustrative material they had raised themselves or the Botanic Garden could offer.

The members of these gardens were debarred from exhibiting in the regular fall exhibit; but medals were offered for this garden alone, so that all the season the children worked with this in view. First and second prizes were offered for the best kept garden, irrespective of amount of produce.

The children's greenhouse classes represented a starting in our work. During the spring, letters were sent to every public elementary school in the city of Brooklyn, offering help and advice in garden work. We went to these schools largely to interest the children in their own home gardens, and incidentally to acquaint them with a source of help, the Brooklyn Botanic Garden. Twenty-one schools out of the total of 167, sent in requests for help. In most cases, the help rendered has been in the form of talks to the children on their own home gardens, how to plant in boxes or little backyards. The response and interest has been greater than was anticipated. At the same time, the children and their teachers and parents have become somewhat acquainted with the Brooklyn Botanic Garden, and with its significance to the City of Brooklyn. After these talks invariably some of the children

from a given school, with parents or with children friends, would come to visit the Garden. One of our objects is to make this a place, not of casual curiosity, but of actual, helpful, everyday interest. So we have felt that the children of the city must use it regularly and with intelligence.

During the past season, the Garden put up and delivered over 25,000 penny packets of seeds for the school children. The list of seeds included the following: beans, beets, carrots, corn, kohl-rabi, lettuce, radish, tomato, cornflower, marigold, nasturtium, salvia, sunflower, sweet alyssum, verbena, and zinnia.

These were put up in envelopes with cultural directions printed on the outside, as follows:

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN BOTANIC GARDEN

PENNY PACKETS OF SEED FOR SCHOOL CHILDREN

MARIGOLD

Directions for Planting

Date: May 1 to June 1.
Place: Garden beds or boxes. Marigolds like sun.
Manner: Scatter the seed in the drill (row), and when the plants are 3 inches high, transplant so plants are 6 inches apart.
Depth: ¼ inch.

The demand was so much greater than we expected that the envelopes and seeds initially prepared were soon exhausted.

After helping stir up a greater interest than ever before in home gardens, it seemed as if some follow-up system should be employed. In many cases, the school influence covers this, sometimes it does not, so a card was prepared reading as follows:

BROOKLYN BOTANIC GARDEN
HOME GARDEN RECORD

Name
School No. Grade Principal
Garden in yard or box?
Flowers grown:
Vegetables grown:
Class of exhibit: Date:

These cards were sent to the schools, and an offer was made to follow up gardens during the summer in those cases where the principals felt that help was needed. One hundred of these cards were returned to us. Many more pupils signed cards, merely to show that they intended to work their gardens during the summer, but did not feel the need of special supervision.

The gardens were visited and the following card used to help in the final award of prizes.

DATA FOR PRIZE AWARDS

Dimensions of Garden in feet:
Soil character:
Fertilizer used:

Date of Visit	Inspector	Condition 25%	Care 25%	Crop 25%	Arrangem't 25%	Rating

Final rating:

Judges { _____ _____ _____

In many cases, these gardens were very poor, but this was due usually to lack of intelligence, or to little understanding on the part of parents as to how they could help their children. But on the other hand, there were many encouraging sides to the work. There were homes where the fathers took time from their own work to make a box for the child's garden, or to spade up a back-yard, or to be at home when the garden was visited to hear the criticism of the work.

The prizes offered merely stand for success over difficulties. In order that the children might work with added zeal all summer,

a special *Leaflet* was issued, June 3, explaining carefully the classes and sub-classes of the Children's Garden Exhibit, September 24–26.

It was hoped in this way to gather up the work which has been carried on for a long time, but which has never been centered as a unit. To raise a plant from seed seems as important educa-

FIG. 12. Medal, awarded at Children's Garden Exhibit, 1914, for excellence of individual exhibits. First prize in silver; second prize in bronze.

tionally, as to run a foot race. In such an open city as Brooklyn, it is easy to teach the children the possibilities in their own back yards, and the resources of the parks, and to create thus a feeling of civic pride in the general appearance of their city. So this garden exhibit has been planned, not merely to encourage chil-

dren to raise flowers and vegetables, but because of those broader underlying lessons of life. The following are the classes of exhibits:

CLASSES OF EXHIBITS

All classes are open to any boy or girl residing in the city of Brooklyn, although the garden may be either in Brooklyn or at a summer place.

Class A. *Vegetables*—First and second prizes will be awarded.

No. 1. Beans, Bush.
Best quart of beans in the pod.

No. 2. Beans, Bush.
Best pint of beans, shelled.

No. 3. Beets.
Best bunch of six beets.

No. 4. Carrots.
Best bunch of five carrots.

No. 5. Cabbage.
Best head of cabbage.

No. 6. Corn.
Best six ears of corn.

No. 7. Celery.
Best four plants of celery.

No. 8. Kohlrabi.
Best four.

No. 9. Lettuce.
Best two heads (roots and all).

No. 10. Radish.
Best eight.

No. 11. Squash.
Best one.

No. 12. Tomatoes, Red.
Best six.

No. 13. Tomatoes, Yellow.
Best six.

Class B. *Flowers*—First and second prizes will be given, as in Class A.

No. 1. Ageratum.
Best plant (potted).

No. 2. Asters, White.
Best collection of twelve.

No. 3. Asters, Pink.
Best collection of twelve.

No. 4. Asters, Purple.
Best collection of twelve.

No. 5. Cornflower.
Best collection of twelve.

No. 6. Marigold.
Best collection of eight.

No. 7. Nasturtium.
Best collection of twelve, one or more varieties.

No. 8. Nasturtium.
Best single potted plant or dwarf variety.

No. 9. Scabiosa.
Best collection of eight.

No. 10. Sunflower.
Largest specimen of sunflower.

No. 11. Verbena.
Best collection of twelve.

No. 12. Zinnia.
Best collection of eight, one color.

Class C. *School Display*—One prize, a trophy, to the school making the best display.

Class D. *Individual Garden Display*—First and second prizes will be awarded for the greatest variety of flowers raised by one child.

The prizes offered are first and second individual prizes, and a trophy for the best school display. The individual prizes are medals; the first, a silver one; the second, bronze. The design, (fig. 12) is the same on both. The center is a representation of the Brooklyn Botanic Garden emblem, used on the front page of the cover of the RECORD. Upon the back of each medal is engraved the name of the winner, the class, and date. The trophy (fig. 11) is a bronze figure, by Villanis, of Victory, trumpet in hand, bearing a branch of the victor's laurel. This trophy is to be competed for each year until one school has won it three times; then it will become the property of that school, and a new trophy will be offered.

Ellen Eddy Shaw

THE JAPANESE GARDEN

In an address before the Brooklyn Woman's Club, January 26, 1914, the director of the Garden mentioned that, among other things, the Garden hoped some day to have a Japanese garden. As a result of this statement, and through the good offices of Mrs. William P. Hamilton, the Garden authorities were placed in communication with the then Japanese Consul-General at New York, Mr. J. Iijima. Mr. Iijima at once became very much interested in the plan, and put the Garden in touch with Mr. T. Shiota, the foremost Japanese landscape architect now in America. Mr. Shiota prepared two plans for gardens at different locations on the shore of the Garden lake. One of these plans was adopted, and through the very generous offer of the chairman of the committee on Botanic Garden to finance the undertaking, the Garden was enabled to enter into a contract with Mr. Shiota.

Work on the garden began on May 17, and has progressed rapidly all summer, involving the construction, by Japanese workmen, of a tea house, a summer house, a temple, a torii, a series of

cascades, and several bridges. Two stone lanterns and two stone foxes were imported for the garden from Japan, being personally selected by Mr. Ushikubo, of Yamanaka & Company, Fifth Ave. They arrived during the last week in August. One of the lanterns is of the shape known to the Japanese as Okuno-in, the other as Yukimi. The Okuno-in lantern was presented to the Garden by Messrs. Yamanaka & Co.

During the summer, pine trees that were growing in the Botanic Garden have been trimmed, bent, and fastened into a shape fitting them to occupy definite positions in the Japanese garden. A more extended and illustrated account of the garden will appear later.

There are several Japanese gardens on private estates in various parts of the country, but so far as the writer is informed, there does not now exist, in any public park east of the Rocky Mountains, a real Japanese garden, planned and constructed by Japanese, and open free to the public.

C. S. G.

INSECT AND FUNGOUS PESTS IN THE GARDEN DURING 1914

Constant vigilance has been necessary during 1914 in order to keep in check pestiferous insects which have infested the plants in the Garden. This has been particularly the case in regard to aphids, which appeared in enormous numbers; consisting mainly of the green and black varieties. Frequent spraying with a contact spray was necessary in order to keep them in check; the spray used being a solution of nicotine, combined with soap, which gives the mixture greater penetrative power, and helps to prevent the formation of globules of spray solution. In the conservatories spraying, fumigation with tobacco stems, and dusting the affected plants with tobacco dust, have been the methods of control adopted.

Another pest that belongs to the sucking insect group is the white fly. This was probably introduced to the conservatories with a shipment of plants received from Florida. The white fly is not harmed by nicotine fumigation, but succumbs to hydro-

cyanic acid gas. However, owing to the dangerous nature of the last named remedy, it was thought inadvisable to make use of this method of extermination. Owing to the active movements of this pest when in the adult stage, it is rather difficult to exterminate it by means of spraying, since it is necessary for the spray actually to hit the insect; but by spraying two or three times at intervals of a day or two, the pest may, for the most part, be overcome.

Other sucking insects that are almost invariably present in plant houses (and the conservatories of the Brooklyn Botanic Garden are not exceptional in this respect) are the mealy bug (*Dactylopius destructor*), several species of scale insects belonging to the Coccidae, and the red spider (*Tetranychus telarius*). Mealy bug and scale insects can be destroyed by constant spraying with a contact spray of some kind, the most effective preparation being kerosene emulsion. The spraying, however, has to be repeated often, and the more efficacious method is, where the nature of the plants permit, to wash off the insects with a sponge and soapy water. Red spider flourishes in a dry atmosphere, and the best methods of control are the maintenance of humidity and spraying with clear water, which must be applied to the underside of the leaves, where the red spider has his habitation, with a sufficient force to break the webs. Potassium sulphide, at the rate of one or two ounces to three gallons of water, applied in the same way, is also helpful, but has the disadvantage of discoloring any paint with which it comes in contact.

A sucking insect, which amongst horticulturists goes by the name of the white tailed mealy bug, lantane bug, and white fly, has been observed on plants of Coleus. This pest (*Orthezia insignis*) belongs to the Coccidae and is extremely difficult to control. The most effective preparation to use against these insects is kerosene emulsion.

Plants out of doors have been attacked by other sucking insects, in addition to aphids; namely, the leaf hopper, and one of the lace bugs (rhododendron fly) which have attacked the rhododendrons.

Of biting insects, those which have caused the most trouble are the larvae (caterpillars) of various kinds of moths and butterflies. The principal objects of attack have been the willows, which

are planted along the brook, but owing to timely spraying little damage has been done. Grasshoppers, rose-bugs, and striped cucumber beetle have also appeared but not in any quantity as yet. One of the best methods of control for biting insects is to dust, or spray, the leaves of the plant attacked, or likely to be attacked, with an arsenical poison—either paris green or arsenate of lead.

Cut-worms, which have attacked tobacco plants, have fortunately not been very numerous. A poisoned bait of some kind is perhaps the best method of combating these pests.

Although rabbits can hardly be classed as "insect pests," yet some trouble has been experienced on account of their habit of using the Garden as a feeding and breeding ground. Fortunately, in the early summer, a nest was discovered containing six young rabbits which were disposed of in a way that will prevent them from doing any damage in the garden.

A few borers, probably the apple tree borer, were discovered on two or three specimens of Crataegus. These feed upon the inner bark of the tree, causing the death of the branch attacked. There is really no effective known way of preventing the attacks of these insects, as the application of a wash sufficiently strong to prevent the insects from gaining an entrance to the hole would injure the tree. All that can be done is to kill the borers by the insertion of a wire into their burrows as soon as their presence is evident.

A disease which seems likely to cause more trouble in the Garden than any other is a rot, possibly of bacterial origin, which attacks the roots of herbaceous plants and, unfortunately, has appeared in many parts of the Garden. The disease usually shows its presence just as the plant reaches the blossoming or fruiting stage. It causes the plant to wither, and death usually occurs within two or three weeks. The treatment, up to the present, has been to thoroughly soak the soil around the roots with a solution of potassium permanganate in cases where the plants have not been actually killed by the disease, or to sterilize the soil with a solution of formaldehyde if the death of the plant has actually taken place.

Another disease, also probably of bacterial nature, has been discovered on the trilliums, causing the death of the plants attacked.

A species of *Aspidium* and one of *Diplazium* have been attacked by the fern eel-worm. This causes deep brown blotches on the fronds of the plant, completely spoiling its appearance. The eggs of the pest are deposited in the soil, and when hatched out migrate to the leaves. Treatment consists of fumigating the soil with carbon bisulphide, or drenching it with a solution of potassium permanganate. The leaves are dusted with a mixture of tobacco dust and flowers of sulphur, and this prevents the insects from entering the leaves.

No very serious fungous disease has made itself known during the year.

Plants of *Prunus serotina* have been attacked by a "shot-hole" fungus, probably a species of *Cylindrosporium*. The fungus causes small circular pieces of the leaves to die and fall to the ground, giving the leaves the appearance of having been riddled and shot. The remedy for this disease is to till the soil thoroughly in the autumn, thus burying the pieces of leaves which contain the fungus, and to spray the trees in spring with Bordeaux mixture to prevent the germination of pores and subsequent growth on the leaves.

Leaf-spot on garden peas has occurred and occasioned some annoyance. The fungi concerned in this case are believed to be *Septoria Pisi* and *Ascochyta Pisi*.

Other fungous diseases, which are apparently not greatly to be feared, are a "rust" (*Puccinia Thalictri*), which has appeared on a plant of *Thalictrum* in the local flora section, and a "smut" (*Urocystis Anemones*) attacking the hepaticas, also in the local flora section.

A leaf spot of unknown origin has been noticed on the water lilies in the lake, but it does not appear to cause any serious damage.

Montague Free

CONFERENCES FOR THE BETTER UNDERSTANDING OF POTATO DISEASES AND POTATO IMPROVEMENT

On the invitation of Dr. I. E. Melhus, in charge of the laboratory for the study of potato diseases, maintained by the United

States Department of Agriculture at Caribou, in northern Maine, and of Dr. W. A. Orton, plant pathologist of the Bureau of Plant Industry, the writer recently had the pleasure of joining in a potato study trip through New England. The party consisted of a group of plant pathologists and others interested in potato culture, headed by Dr. Orton and by the acting chief of the Bureau, Professor Corbett. As a special guest of the United States Department of Agriculture, the party was accompanied by Geheimrat Dr. O. Appel, of the Imperial Biological Institute for Agriculture and Forestry, at Berlin-Dahlem, the leading authority on potato diseases in Europe; and also by Dr. H. T. Güssow, the Dominion botanist of Canada, whose discovery of a serious potato disease in Canada precipitated the recent quarantine activities against the entry of dangerous insect and fungous pests into the United States.

The itinerary of the main party, beginning with visits to the truck growing districts in New Jersey on July 28–29, was planned to extend through the larger potato growing regions in Rhode Island, Maine, New York, Michigan, Wisconsin, Minnesota, Colorado, Utah, Idaho, Washington, Oregon, and California, lasting until about October 1. This party was to be joined at intervals by specialists, from State Experiment Stations and elsewhere, who were primarily interested in investigations of the disease, breeding, culture, or related phases of the potato industry.

The writer joined the party, then including only half a dozen, at the State Experiment Station at Kingston, Rhode Island, on the morning of July 30. Here, besides inspecting under the guidance of Professors Damon and Pember, the varietal tests of potatoes, and studying the diseases present in the plots, I accompanied Mr. F. V. Coville, of the Bureau of Plant Industry, in his inspection of blue-berry culture experiments, being carried on at the station farm in cooperation with the Bureau.

On arrival at Caribou, Maine, on the morning of July 31, the party was augmented by a considerable number of plant pathologists, inspectors and others interested in potato culture, about ten of whom were connected with the government laboratory at Caribou, and others from the Maine and Vermont State Departments of Agriculture, from the Maine Agricultural Experi-

ment Station, from the Truck Experiment Station at Norfolk, Va., and elsewhere. The scientific men of the party at this point numbered about twenty. Guided by Dr. Melhus, who had the enthusiastic and appreciative assistance of a number of the local potato growers, bankers, and other business men, the party was taken, on the afternoon of their arrival, to visit the tuber unit, varietal and potato disease plots maintained by the government on the hills overlooking Caribou, and to various nearby localities where hundreds of acres of beautifully blooming potato fields were inspected. Under the instruction of Dr. Orton, Geheimrat Appel, Dr. Güssow, and others, the members of the party thus became more familiar with the characteristics and field conditions of certain obscure potato diseases, new or unfamiliar to many, such as leaf roll, curly dwarf, mosaic, black leg, rhizoctonia, streak, etc. Some of these diseases, rhizoctonia and black leg, for example, were seen to be of a very serious nature, materially threatening the season's yield of tubers; others, such as mosaic and leaf roll, while not apparently at present decreasing the number and size of tubers, promise trouble for the future if allowed to persist and spread without hindrance. On a later day, some of the party were privileged to examine the experimental disease plots of the government station, where problems of the growth, dissemination, control, etc., of potato blight, powdery scab, silver scurf and other diseases, were being carefully studied.

On the following day, August 1, the whole group of thirty and more were taken in automobiles on a long and strenuous inspection trip of hundreds of acres of potato fields, covering nearly a hundred miles, and ending at night at the prosperous city of Houlton, in the southern end of Aroostook County. The next day, the return to Caribou was made by automobile and train; and on Monday, another long journey was made toward the north to Ft. Kent, and other districts and towns along the St. John river and the Canadian border.

The hospitality and enthusiastic appreciation of the citizens and potato growers were clearly evidenced in all the localities visited, as well as at the banquets and receptions given by commercial clubs to the visiting scientists at the towns of Caribou, Presque Isle, and Houlton. In the talks and speeches made at these more

or less formal meetings, and perhaps even more convincingly in the informal conferences held in the field and elsewhere, the supreme importance of pure and healthy seed potatoes, not only to Maine, but also to a large section of the country to the south, which is dependent upon Maine for seed, was made exceedingly manifest to all present.

The officials of the United States Department of Agriculture in charge of this study trip certainly have a very clear, broad conception of the fundamental importance, to the agricultural interests at large, of properly conserving the pure seed supply of potatoes. The northern sections, of which Aroostook County, Maine, is a notable example, raise the bulk of the seed potatoes for the potato districts lying to the south. Therefore, if disease is kept out of the Maine supply of seed tubers, it is quite likely that the potato fields of Long Island, New Jersey, Virginia and the South will be kept freer from the ravages of disease; and, consequently, better crops in general will be raised. The State Department of Agriculture of Maine, in fact, plans to issue certificates that certain crops of potatoes are true to name, and are free from dangerous diseases. Both state and national inspectors are now working in close cooperation on this work. The method of procedure involves a rigid inspection of the fields of applicants for such certification, at blooming time as well as at harvest time.

One promising method of attack of this pure seed problem, inaugurated by Dr. Melhus and Dr. Orton, and one in which the Brooklyn Botanic Garden has been especially interested, is that of placing young men, experts in potato diseases, in the field, in the service of the grower for the season, whose duty it is to keep close watch of all the details of selection, the proper methods of cutting, treating, and planting seed tubers, the very first appearance, control, and final eradication of diseases which may appear, the "roguing" for disease or for stray intruders in an otherwise pure variety, as well as the final harvesting, inspection, and storage of the crop. There are only three of these "consulting plant pathologists" employed during the present season, salaried by some of the larger growers, but under the direct supervision of the government officials. One, Mr. Bisby, is from the Brooklyn

Botanic Garden; another, Mr. Faulwetter, is recently from Cornell University; while the third, Mr. Hartman, comes from Pennsylvania State College.

Edgar W. Olive

ALGAE IN THE GARDEN BROOK

During the present season, the algae have been especially abundant in the pools of the Garden brook. Scums have covered the quieter pools; the rocks forming the water-falls have been covered with a dark, slimy growth; accumulations of greenish material have gathered on the rocks below the cascades; while the outlet at the lower end of the brook has become at times choked. From one point of view, these pond scums (called "frog spittle" by some) form unsightly accumulations of greenish, slimy material, and hence are unwelcome as residents of the Garden brook. To such as do not appreciate the beauty and interest of these plant growths from a microscopic point of view, they appear as unattractive and undesirable intruders.

From another point of view, these green, aquatic growths are exceedingly interesting and attractive plants and the Botanic Garden should, at least to a limited extent, permit and even encourage their presence. To those interested in microscopic life, to the teacher of botany, as well as to the student of the varying forms of plant and animal life, such organisms as we find growing in the brook are indispensable. When the brook was first made, its rocks were bare and unattractive; and the whole stream retained for a time its artificial look. Now, after two years, the rocks, except those that are yet too smooth from the glacial polishing, are taking on mossy or algal growths, and the bed of the stream is becoming brownish with diatoms or tinged with green from microscopic plant growths. It is indeed fast losing its artificial appearance and has taken on much of the beauty of unaided nature.

For the greater part of the present growing season, the greenish scums of the pools have been composed almost exclusively of water-net, or *Hydrodictyon*. During the summer of 1913, this water-net, if present at all, was at least inconspicuous, as none was

observed until late in the fall. A single plant of water-net, when viewed closely, is composed of a net as delicate as that of a lady's veil; and each complete mature plant, as can readily be seen in young specimens, has the shape of a slender, hollow cylinder, or sac, sometimes six or eight inches long, and closed and rounded at both ends. Mixed with the *Hydrodictyon,* there has developed in the brook during the past season a small amount of *Spirogyra,* and a few other filamentous algea. The rocks forming the dams at the water-falls have been covered largely with a slimy, dark-green coating, mainly of *Phormidium* and other species of blue-green algae.

Under favorable conditions of growth, the *Hydrodictyon* reproduces very rapidly, by means of a complicated, yet fascinating, process called "swarming" of the millions of zoospores, or animal-like reproducing cells.

The rapidity of reproduction of the water-net and the astounding increase, may be readily explained by the fact that each of the 7,000 to 20,000 cells which compose the sac-like plant may in turn, by the swarming of its contents, produce a new cylindrical net-work, composed, like the parent plant, of thousands of cells. Thus, every three or four weeks there would result a new crop of perhaps 20,000 new plants from each old water-net sac. Starting with but a single plant, the increase by geometrical ratio would thus, in but a single season, result in unthinkable billions of progeny.

The extraordinary increase of the water-net in the lower pools of the brook has given some concern to the Garden authorities, who have tried to devise some means of adequate control. Two methods of control were suggested: one, the use of copper sulphate, a very dilute solution of which is poisonous to the algae; the other, the raking out and final hauling away of the tangled scums and algal growths. Up to the present, copper sulphate has been applied but once to the brook, and then only to the lowest pool. It was realized at the time that this application to the lowest pool was practically valueless as an experiment, since the stream was constantly carrying down from above bits of algae, which would thus serve to replenish the supply almost as fast as it could be destroyed by the poison. Another suggestion was to

add copper sulphate at frequent intervals in sufficient amount to the upper lake, in which the brook has its rise, or else to the brook at its source at the outlet of the lake. This suggestion takes for granted the unproved and doubtful proposition that dissolved copper would be carried from the head of the brook throughout its length in sufficient amount to destroy the algae in the intervening pools. The copper sulphate method for killing algae has not, to my knowledge, been so far tried out for rapidly moving streams, such as we have in the Garden brook. It has, however, proven singularly efficacious in destroying algae in quiet reservoirs, lakes, aquaria, and watercress beds; in keeping water molds from minnow boxes; and in destroying bacteria in sewage effluents.

Intelligently used, copper sulphate is undoubtedly a valuable adjunct in protecting bodies of water against excessive growths of algae. For several reasons, however, it must be used with extreme caution. In the first place, certain kinds of fish are readily killed by injudicious applications of the poison. Thus, trout have been shown to be very susceptible, the limit of safety being placed by Kellerman at 0.14 parts of sulphate per million gallons of water. The limit of safety for carp is somewhat higher, being placed at 0.30 parts, and for goldfish at 0.50 parts per million gallons of water. The amounts required for the destruction of some algae are dangerously near the amounts which are found also to kill fish. For example, *Hydrodictyon* requires 0.10 parts of copper sulphate (or 0.88 of a pound) per million gallons of water; the more troublesome blue-green algae require from 0.10 to 0.30 parts per million, while some of the more resistant and troublesome diatoms and green algae require as much as 1 part (equivalent to 8.3 pounds) of copper sulphate per million gallons. The possibility of injury to some of the higher flowering plants growing in the brook must also be taken into careful consideration, especially in view of the fact that exposed roots of the willows and other plants, which in many places have grown out into the stream, lend themselves liable to serious injury from the poison. And, finally, the fact cannot be lost sight of that even though the copper sulphate method may prove efficacious in killing the algae of the Garden brook, the dead and unquestionably unsightly scums themselves must afterward be removed in some manner. All of

which facts and arguments seem to render very doubtful the wisdom of the use of this method for our purposes.

The second method has been in use in the Garden brook for some time with unquestioned success. This consists in raking out on to the banks the green floating growths, using for the purpose a broad wooden rake; and hauling the mass away in a wheelbarrow after the surplus water has been drained off. The work has required so far the services of two men for about one day a week. The amount which accumulates in the pools and on the rocks during a single week of hot, muggy weather is truly astounding. This method, if carefully applied, injures none of the flowering plants along the brook; the minute and microscopic animal and plant forms are allowed to survive in reasonable numbers, so as to be available for study or collection at some future time; and the small amount of green which remains adds to the bed of the brook an indispensable touch of naturalness and softness of color very pleasing to the eye.

EDGAR W. OLIVE.

DOCTORATES CONFERRED IN BOTANY BY AMERICAN UNIVERSITIES IN 1914

It is worthy of note that botany, in 1914 as in the previous year, is second in the number of doctorates conferred in the natural and exact sciences. According to the lists published in *Science* N. S. **40**: 256–264. 21 Au 1914, chemistry, as heretofore, leads with 71 degrees, botany being credited with 34 degrees, zoology with 25. The rapid rise in number in botany from 11 in 1908 to 34 in 1914, is probably largely attributable to the rapidly growing popularity of plant pathology.

It will be noted that the following list comprises 41 titles of doctorate theses in botany, instead of 34, as indicated in *Science*. I am unable fully to account for this striking discrepancy, although it is partially explained in the fact that in the article referred to, Cornell is stated to have granted 7 degrees in botany, while my list shows 10; Wisconsin is said to have given 6, while my list has 7. Perhaps these differences may arise in large part from a different view-point in regard to the sciences of agriculture and physiology.

Indeed, in order to secure the fairest classification, it would obviously be necessary to have the proper authorities in the various universities place the theses in the categories in which they really belong.

CORNELL UNIVERSITY

Paul Johnson Anderson: The morphology and life history of the chestnut blight fungus.

Harris Miller Benedict: Senile changes in leaves of *Vitis vulpina* L. and certain other plants.

Forest Milo Blodgett: Perithecial development of *Sphaerotheca humili.*

Jehiel Davidson: A comparative study of the effect of cumarin and vanilin on wheat grown in soil, sand and water cultures.

Howard Brett Frost: The relation of temperature to variation in *Matthiola.*

Charles Truman Gregory: The downy mildew disease of grapes.

Lexemuel Ray Hesler: Black-rot, leaf-spot and canker of pomaceous fruits.

Robert Andrew Jehle: Brown rot of orchard fruits.

Emmeline Moore: Potamogetons in relation to pond culture.

William Howard Rankin: Field studies on *Endothia* canker of chestnut in New York state.

UNIVERSITY OF CHICAGO

Winifred McKenzie Atwood: A physiological study of the germination of *Avena fatua.*

George Smith Bryan: The archegonium of *Sphagnum subsecundum.*

George Damon Fuller: Evaporation and soil moisture in relation to the succession of plant association.

Edward Maris Harvey: Some effects of ethylene on the metabolism of plants.

John Benjamin Hill: The anatomy of six epiphytic species of *Lycopodium.*

Lee Irving Knight: A study of dormancy in buds of *Liriodendron tulipifera.*

Florence Anna McCormick: A study of *Symphyogyna aspera.*

John Nathan Martin: Comparative morphology of some Leguminosae.

Loren Clifford Petry: The anatomy of *Ophioglossum pendulum.*

Norma Etta Pfeiffer: Morphology of *Thismia* (*Bagnisia*) *americana* n. sp.

HARVARD UNIVERSITY

William T. Bovie: The action of ultra-violet light on protoplasm.

Arthur Houston Chivers: The fungus genera *Chaetomium* and *Ascotricha.*

Walter Palmer Thompson: The anatomy and relationships of the Gnetales. I. The genus *Ephedra.*

COLUMBIA UNIVERSITY

Fred Denton Fromme: The morphology and cytology of the aecidium-cup.

Louis Otto Kunkel: Physical and chemical factors influencing toxicity of inorganic salts to *Monilia sitophila* (Mont.) Sacc.

UNIVERSITY OF ILLINOIS

Philip Augustus Lehenbauer: Growth in relation to temperature.

John Hamilton Whitten: The effect of kerosene and other petroleum oils on the viability and growth of *Zea mais.*

UNIVERSITY OF WISCONSIN

Elbert T. Bartholemew: Physiological changes causing black heart in potatoes.

Howard Austin Edson: Damping off and root decay of sugar beets.

Edward Martinius Gilbert: Cytological studies on the Tremelineae.

Martin Perry Henderson: Studies on the black leg disease of cabbage.

Aaron Guy Johnson: The helminthosporium diseases of barley.

George Wanamaker Keitt: Peach "Scab" (*Cladosporium carpophilum* Thüm) and its control.

Gilbert Morgan Smith: Organization of the colony in certain four-celled coenobic algae.

UNIVERSITY OF MICHIGAN

John Henry Ehlers: Winter temperature of the leaves of the Pine.

UNIVERSITY OF MINNESOTA

Harry Vaughn Harlan: Some distinctions in our cultivated barleys with reference to their use in plant breeding.

Julius Valentine Hofmann: Natural reproduction of coniferous forests.

UNIVERSITY OF CINCINNATI

Emma Lucy Braun: The physiographic ecology of the Cincinnati region.

UNIVERSITY OF MISSOURI

William Henry Chandler: The killing of plant tissue by low temperature.

UNIVERSITY OF NEBRASKA

Melvin Randolph Gilmore: On the uses of plants by the Indians of the Nebraska region.

WASHINGTON UNIVERSITY

Jacquelin Smith Cooley: A study of the physiological relations of *Sclerotinia cinerea* (Bon.).

E. W. O.

NOTES

On August 17, 1914, Acting Mayor McAneny signed the agreement by which the tract of about eight acres of land lying opposite the Willinck entrance to Prospect Park, and south of the original boundary of the Garden, was turned over to the Brooklyn Institute of Arts and Sciences for botanic garden purposes. With this, the total area of the Garden is approximately fifty acres. Preliminary plans have been drawn for its development.

The second contract for grading was awarded by the Board of Park Commissioners on May 21, 1914, to Messrs. Norton & Gorman, at the bid price of $9,979.20. Work began on July 25, and was completed on September 19.

The work on the construction of new paths in the Garden, begun on May 6, 1914, by Di Menna & De Paola, was practically completed on October 31.

On August 27–30, Mr. Taylor was collecting plants for the Garden in the vicinity of Copake Falls, N. Y.

Among the plants now bearing fruit in the tropical economic house are the pineapple, and the fig (*Ficus carica*). Though the young fig tree is only about 30 inches high, it has produced twelve figs. In the same house the pistillate plants of hemp have attained the remarkable height of over 17 feet.

Visitors to the Garden since the last issue of the RECORD include Mr. Harold Wingate, Brooklyn, Mr. A. D. Darbishire, lecturer in zoology at the University of Edinburgh, Scotland, and Dr. Otto Appel, Geheimrat Regierungsrat, professor in the Kaiserliche Biologischen Anstalt für Land- und Forstwirtschaft, Berlin-Dahlem, Germany. Prof. Appel was advised by the German consul-general of New York not to try to return to his native land until conditions in Europe become more normal.

Prof. H. J. Banker, who called at the Garden on July 10 and August 3, has resigned the professorship of biology in DePauw University, which he has held since 1904, and has accepted a position with the Eugenics Record Office of the Carnegie Institution of Washington, at Cold Spring Harbor, L. I.

Prof. Adolf J. A. Fredholm, M.D., D.Agr., formerly agronomist of the experiment station, Port-of-Spain, Trinidad, and now professor of agronomy in the university of Porto Rico, at Mayaguez, visited the Garden on August 20.

Psychology in Park Management: The malicious (?) girdling of white birches in the Garden was followed by our placing on the injured trees a notice calling attention to the injury, and stating briefly the botanical reasons why it would prove fatal to the life of the trees. The matter was made the subject of *Garden Leaflet* Ser. II, No. 7, Vandalism turned to account, which was reprinted in full in *Home Progress* 3:555–556, Ag 1914. This leaflet has occasioned much comment, some of it favorable, and some questioning the advisability of the label on the girdled birch, holding that the presence of the label on the tree first injured may have been and quite probably was, the direct stimulus to the girdling of the second tree. One correspondent has written as follows:

"I would like to make a suggestion, and that is that it is quite likely that the destruction of the trees is not intentional and malicious in the sense of the free-will theory but that it is done in somewhat the same spirit as one burns a house or jumps in front of a passing railroad train. I think the hypothesis is equally probable that the act is done under a momentary impulse which is irresistible but which has back of it nothing which can properly be called *malice*. By this hypothesis the worst possible thing to do is to offer any suggestion of the possibility of such evil. I beg, therefore, to offer the suggestion, which I am quite sure many psychiatrists would agree with:—Just the prominence you have made of the injured tree and its consequences is of the sort which will lead to a suggestion on the part of certain hysterical or feebly inhibited persons, leading them to do that which without the sign and the striking evidence would have hardly occurred to them; at

any rate in such force as to lead to the uninhibitable impulse; i. e., the second act was inspired or 'suggested' by your notice. Such at least is the clear teaching of the theory of the absence of free will under which I am living.

"By hypothesis a better example would be a girdled tree which (by the aid of a piece of inserted bark) was permitted to survive. 'Girdling a tree really isn't so important and fatal a matter as you think,' would be the notice (if any) that this would give; and that idea would do away with the impulse."

By invitation of the Garden, the Brooklyn Aquarium Society has recently installed in our conservatories four balanced aquaria, for the purpose of demonstrating the relation between aquatic flora and fauna. This is a very instructive as well as attractive exhibit.

We learn from *The Botanical Journal,* the official organ of the Royal Botanic Society of London, that on October 6, 1913, an open-air school was started at the Garden, under the direction of Miss Margaret Nuth. The objects of this school are to give the children the best of health, as well as the best of education. There are fourteen in attendance, mostly the children of physicians and surgeons. The school is not confined to the children of medical parents, but is open to the children of all members of the Royal Botanic Society who present a clean bill of health. "No unhealthy child is admitted, the idea being to prevent all troubles, not to patch up cripples." All lessons are held in the open, except during rain or fog or a temperature below 40° Fahrenheit. The following remark is quoted from one of the pupils: "I don't know how children can learn indoors. We stand by the lake and learn all about the capes and bays, the peninsulas and promontories and islands; but in a room they cannot do that, can they?" The teachers in the schools of Brooklyn are reminded that the grounds of the Brooklyn Botanic Garden are rich in opportunities for out-of-door lessons in geography and other subjects, as well as in botany, and classes are cordially welcome for field study in any subject.

The island in the lake at the Royal Botanic Society's Gardens, for many years a place neglected, has, by vote of the Council, been

developed as an Alpine garden. "The central mound is made of Derbyshire rock, and the winding paths of oolitic flagstones. Many hundreds of Alpine plants, rock-roses, saxifrages, pinks, gentians, campanulas and sedums, with the eidelweis, have been planted, and every requirement as to soil, moisture and light has been observed as far as possible. The experiment is a daring one, for the climate of London is difficult even to our native plants, and to take Alpine plants direct from the Alps would be to court failure. This has not been done, however, for the plants are several generations removed from their purely wild ancestors. Correvon, the great authority on Alpine plants, has told us that some of the most beautiful of the species, which he had found it difficult to grow in its own garden, in Switzerland, grew with freedom in English Alpine gardens. Doubtless there are some which no amount of care will keep alive in London. Our common English primrose will not last longer than three years in London, although its garden descendant does particularly well here."—*Botanical Journal,* Vol. III, No. 2, London, July, 1914. The alpine garden has been named "The Teck Garden," in honor of their Highnesses the Duke and Duchess of Teck. The Duke is president of the society.

Lawns and Grass in London.—"It is always with surprise and sometimes with envy that American and country visitors note the perfection of the lawns and grass generally in our London parks and gardens. The smoke-polluted atmosphere which acts as a bar to growth in the case of so many trees and shrubs seems to have no ill effect whatever upon the grass. The farmer who expected a hay crop year after year without the aid of manure or fertilizer would be thought to lack sense. Yet no London gardener thinks it necessary to manure his lawns or grassed spaces, although in the aggregate the constant mowing removes quite as much grass in the course of a summer as would give a crop of hay, and this process goes on year after year. A well-known gardening expert, when questioned on the point, gave it as his opinion that the greenness and vigor of London grass was entirely due to the sooty impurities of London air. And when the matter is fairly considered no other solution seems possible. That soot

is a good manure most people know. The leaves of the grasses, being upright, are washed clean on both sides by every shower; the soot is carried down into the soil, and by the time growth commences in the spring there is collected near the fibrous roots enough food to last the summer through.

"It is some consolation to find that London fog and London smoke are not quite so bad as most people think them."—*The Botanical Journal,* 3: 10. Ap 1914.

The Park Museum, in Roger Williams Park, Providence, R. I., is actively engaged in cooperation with the work of the local schools in Providence. In addition to a course of free lectures given on Sunday afternoons, occasional lectures are given by prearrangement to visiting schools and other organizations. Lectures are also given at the schools, to either the whole school or to particular grades upon request of the Principal, and duplicate material is loaned to schools for study purposes. A list of such material, furnished to teachers, includes birds and bird charts, insects, minerals, soils, and mammals, and for botany, ten different species of native woods, 250 colored lantern slides of common wild flowers, and a list of plant material that will be collected upon request, provided notice is given three days in advance by postal or telephone. This latter list is as follows: 1. Buds of pussy-willow, horse-chestnut, lilac, Forsythia, and alder; 2. Leaves of any of the common trees; 3. Evergreen twigs; 4. Wild flowers in season.

The school sends a pupil for the material, which may be kept three weeks, and may be sub-loaned, if desired, to other teachers in the same building. With each loan there is sent a blank record card, with data to be filled in and signed by the teacher as follows:

RECORDS OF CIRCULATING COLLECTION NO. ——

Date Received	Length of Time Retained	Number of Pupils	School	Signature of Teachers

This work is in charge of Mr. Harold L. Madison, curator, assisted by Miss Magoon, who state that the facilities thus offered are increasingly appreciated by the local schools.

Dr. Johan Nordal Fischer Wille, professor of botany and director of the Botanical Garden of the University of Christiania, visited the Garden on September 11, *en route* to attend the celebration of the twenty-fifth anniversary of the Missouri Botanical Garden, to be held October 15 and 16.

Recalling the fact that man is absolutely dependent either directly or indirectly upon plants for food, the following quotation from the Report of the Department of Health of the City of New York for the week ending August 22, 1914, is of interest:

"Chemists have repeatedly called attention to the extravagance of the American public in respect to foods, and have seen in this one of the causes of the high cost of living. Again and again they have pointed out that cheaper cuts of meat, for example, are fully as nourishing as filet and porterhouse steak and that all that is needed is education as to the proper method of cooking.

"What is true of meat applies also to many other foods. Just now, for example, wheat flour has advanced considerably in price, being quoted at $6.75 a barrel. Exactly the same amount of nourishment in the form of rye flour costs $5, a saving of $1.75 a barrel.

"Why should Americans continue to prefer wheat flour, when rye is equally nutritious and very much cheaper? Or why should they not learn, like the Scotch, to make oatmeal, which is even more nutritious, and also much cheaper, a staple article of diet? Or why disdain delicious and wholesome corn meal, highly nutritious and about two thirds the price of wheat flour? Here are some valuable facts for you to remember:

	100 Lbs. Cost
1,000 grams wheat flour contain 3,600 food units.....	$3.35
1,000 grams oatmeal contain 4,100 food units.....	3.20
1,000 grams rye flour contain 3,600 food units.....	2.55
1,000 grams cornmeal contain 3,650 food units.....	2.40

In Memoriam

FRANKLIN WILLIAM HOOPER

Born at Walpole, N. H.
February 11, 1851

Director of the Brooklyn Institute of Arts and Sciences,
1889–1914
Member of the Board of Trustees
Ex Officio Member of the Committee on Botanic Garden
Instrumental in securing the first enactment, by the Legislature of
the State of New York, authorizing the Establishment of
a Botanic Garden on Park Lands in the Borough
of Brooklyn, 1897

Died at Walpole, N. H.
August 1, 1914

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